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Pianoforte

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Pianoforte [piano].

A keyboard instrument distinguished by the fact that its strings are struck by rebounding hammers rather than plucked (as in the harpsichord) or struck by tangents that remain in contact with the strings (as in the clavichord).

The present article treats the history and technique of the instrument; for discussion of the repertory see [KEYBOARD MUSIC, §III](#). Additional information on the contributions of particular makers is given in their individual articles.

In the Hornbostel-Sachs classification of instruments the piano is reckoned as a box zither.

I. History of the instrument

1. Introduction.

The piano has occupied a central place in professional and domestic music-making since the third quarter of the 18th century. In addition to the great capacities inherent in the keyboard itself – the ability to sound simultaneously at least as many notes as one has fingers and therefore to be able to produce an approximation of any work in the entire literature of Western music – the piano's capability of playing notes at widely varying degrees of loudness in response to changes in the force with which the keys are struck, permitting crescendos and decrescendos and a natural dynamic shaping of a musical phrase, gave the instrument an enormous advantage over its predecessors, the clavichord and the harpsichord. (Although the clavichord was also capable of dynamic expression in response to changes in touch, its tone was too small to permit it to be used in ensemble music; the harpsichord, on the other hand, had a louder sound but was incapable of producing significant changes in loudness in response to changes in touch.) The capabilities later acquired of sustaining notes at will after the fingers had left the keys (by means of pedals) and of playing far more loudly than was possible on the harpsichord made this advantage even greater.

The instrument's modern name is a shortened form of that given in the first published description of it (1711) by Scipione Maffei where it is called 'gravecembalo col piano, e forte' ('harpsichord with soft and loud'). 18th-century English sources used the terms 'pianaforte' and 'fortepiano' interchangeably with 'pianoforte'; some scholars reserve 'fortepiano' for the 18th- and early 19th-century instrument, but the cognate is used in Slavonic countries to refer to the modern piano as well. The German word 'Hammerklavier' might refer to the piano in general, or alternatively to the square piano as distinct from the grand piano ('Flügel').

There is no continuity between the remote 15th-century precursors of the piano described by Henri Arnaut de Zwolle around 1440 (see [DULCE MELOS](#)) and the origins of the instrument as discussed in §2 below, though references made in letters dated 1598 from Hippolito Cricca of Ferrara to Duke Cesare d'Este in Modena suggest that an instrument with dynamic flexibility (perhaps equipped with a striking mechanism) was used in the d'Este court in Ferrara during the late 16th century. These letters make repeated reference to a special *instromento pian et forte*, *istromento piane e' forte*, *instromento pian e' forte* and *instromento piano et forte*. An octave spinet

(now in the Metropolitan Museum of Art, New York) made in 1585 by Francesco Bonafinis may have been converted to a tangent piano in the 17th century, providing further evidence that there were isolated attempts to construct string keyboard instruments with striking mechanisms prior to Bartolomeo Cristofori's invention made around 1700 (see §2 below).

The modern piano consists of six major elements: the strings, the metal frames, the soundboard and bridges, the action, the wooden case and the pedals. There are three strings for each note in the treble, two for each note in the tenor, and one for each note in the bass. The massive metal frame supports the enormous tension that the strings impose (approximately 18 tons or 16,400 kg). The bridges communicate the vibrations of the strings to the soundboard which enables these vibrations to be efficiently converted into sound waves, thereby making the sound of the instrument audible. The action consists of the keys, the hammers, and the mechanism that impels the hammers towards the strings when the keys are depressed. The wooden case encloses all of the foregoing. The right pedal (the 'loud' or 'sustaining' pedal) acts to undamp all the strings enabling them to vibrate freely regardless of what keys are depressed. The left pedal (the 'soft pedal' or 'una corda') acts to reduce the volume of tone, either by moving the hammers sideways so that they strike only two of the three strings provided for each note in the treble and one of the two strings provided for each note in the tenor, or by bringing the hammers closer to the strings, thus shortening their stroke, or – on some upright pianos – by interposing a strip of cloth between the hammers and the strings to produce a muffled tone. The middle pedal, when present, acts to keep the dampers raised on only those notes being played at the moment the pedal is depressed.

Logically, the ideal form of the piano is the 'grand', the wing-shape of which is determined by the fact that the strings gradually lengthen from the treble at the right to the bass at the left. Theoretically, the length of the strings might be doubled for each octave of the instrument's range, but this would be impractical for an instrument having a range of over seven octaves, as the modern piano does, and even the earliest pianos with a range of only four octaves employed some shortening of the strings in the extreme bass. The rectangular 'square' piano, which like the grand has its strings in a horizontal plane, and which was popular in the 18th and 19th centuries, has been entirely superseded by various types of 'vertical' or 'upright' piano, which have their strings in a vertical plane; the fact that uprights take up less room outweighs the disadvantage imposed by the more complex action they must use.

Edwin M. Ripin/Stewart Pollens

2. Origins to 1750.

The musical advantages initially possessed by the piano were not generally recognized at the time of its invention even though the instrument made its first appearance in a highly developed form, the work of a single individual, **BARTOLOMEO CRISTOFORI**, keeper of instruments at the Medici court in Florence. Despite warmly argued claims on the part of such other men as Christoph Gottlieb Schröter and Jean Marius, there now seems to be no doubt that Cristofori had actually constructed a working piano before any other maker was even experimenting in this field. The detailed description of an 'arpicimbalo di nuova inventione' in an inventory of the Medici instruments for 1700 establishes that he had by that year already completed at least one instrument of this kind. A precise date is found in an inscription made by Federigo Meccoli (a court musician in Florence) in a copy of Gioseffo Zarlino's *Le istituzioni harmoniche*, which states that the 'arpi cimballo del piano e' forte' was invented by Cristofori in 1700. Cristofori's accomplishment as seen in the three surviving pianos made by him, all of which date from the 1720s, would be difficult to exaggerate. His grasp of the essential problems involved in creating a keyboard instrument that sounded by means of strings struck by hammers was so complete that his action included features meeting every challenge that would be posed to designers of pianos for well over a century. Unfortunately, the very completeness of his design resulted in a complicated mechanism, which builders were apparently unwilling to duplicate if they could possibly devise anything that would work and at the same time be simpler to make. As a result, much of the history of the 18th-century piano is the history of the gradual reinvention or readoption of things that were an integral part of Cristofori's original conception; and it was only with the introduction in the 19th century of increasingly massive hammers that the principles discovered

factor, since Cristofori's lever system, providing for an acceleration of the hammer to eight times the velocity with which the key is depressed, automatically causes the player to feel (at the key) the weight of the hammer multiplied eightfold.

The sound of the surviving Cristofori pianos is very reminiscent of that of the harpsichord owing to the thinness of the strings compared with later instruments and the hardness of the hammers; but it is less brilliant and rather less loud than that of a firmly quilled Italian harpsichord of the time. These points are mentioned in Maffei's account as reasons for the lack of universal praise for the instrument, as is the fact that contemporary keyboard players found the touch difficult to master (in Germany, where the clavichord was used as both a teaching and a practice instrument, no such objection seems to have been raised when the piano became known). On two of the surviving Cristofori pianos it is possible to slide the keyboard sideways so that the hammers strike only one of the two strings provided for each note. Possibly it was the desire to include such a device that caused Cristofori to space his strings widely rather than placing the unisons struck by each hammer close to one another with a wider space between. Apart from this *una corda* capability, Cristofori's pianos make no provision for alteration of the tone by stops or other such devices; however, one would not expect to find such a provision in view of the lack of any multiplicity of stops in Italian harpsichords.

There seems to have been little direct result in Italy of Cristofori's monumental achievement. Maffei, in his account, clearly recognized the important differences between Cristofori's pianos and the harpsichord (even if he had no better name for the new instrument than 'harpsichord with soft and loud'), and an interesting collection of 12 sonatas for the instrument that includes dynamic markings implying crescendos and decrescendos was published in 1732 (Lodovico Giustini's *Sonate da cimbalo di piano e forte*). But only a handful of other Italian instrument makers seem to have followed in Cristofori's footsteps, notably Giovanni Ferrini and Domenico del Mela. It was left primarily to German, Spanish and Portuguese builders and musicians to exploit his work in the years after his death in 1732.

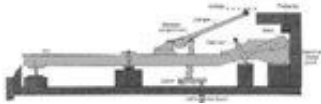
A German translation of Maffei's account was published in Johann Mattheson's *Critica musica*, ii (1725) where it was presumably seen by Gottfried Silbermann, who is reported to have begun experimenting on pianos of his own in the 1730s. He is said to have offered one for Bach's inspection, and at the composer's adverse reaction to its heavy touch and weak treble to have gone on to further experiments resulting in improved instruments, a number of which were bought by Frederick the Great. These are reported to have met with Bach's complete approval when he visited Potsdam in 1747. The two Silbermann pianos owned by Frederick that have survived have actions identical with those in the surviving Cristofori instruments; it seems more than likely that by the time Silbermann made them he had seen an example, whereas his earlier attempts had failed as a result of having been based on the diagram accompanying Maffei's description – which Maffei admitted had been drawn from memory without the instrument before him. Silbermann retained Cristofori's inverted wrest plank and the equidistant spacing of the strings and he used the hollow hammers made of rolled paper found in the 1726 instrument which, together with the check replacing silk strands, evidently replaced the small blocks shown in Maffei's diagram. As might be expected from a representative of the north European keyboard instrument building tradition, Silbermann included hand stops for raising the treble and bass dampers in addition to devices for sliding the keyboard sideways so that the hammers would strike only one of the two strings provided for each note. Thus, these two most characteristic means of modifying the piano's tone, integral to all modern pianos, were found together as early as the 1740s.

Although Gottfried Silbermann and his nephew Johann Heinrich Silbermann seem to have made direct copies of Cristofori's hammer action, virtually unchanged except for the addition of damper-lifting mechanisms, other German makers, some of whom may perhaps not even have been explicitly informed of Cristofori's work to the extent of knowing of the existence of 'hammer harpsichords', devised a host of less complicated actions, many adapted to the rectangular clavichord-shaped square pianos. In an early example, a hammer hinged to the back of the case is thrust upwards by a block at the end of the key, reducing Cristofori's mechanism to an absolute minimum. This type of action became known as the *Stossmechanik* and is the principle upon which the later English builders and their followers built their pianos (see §4 below). The great period of piano building in the German-speaking world is not, however, represented by these developments or even by Silbermann's work, which with the death of his son seems to have led to no direct line of Cristofori-inspired instrument building. Rather, a different approach evolved –

using a type of action known as the *Prellmechanik* – which dominated German piano building for the next 75 years.

Edwin M. Ripin/Stewart Pollens

3. Germany and Austria, 1750–1800.

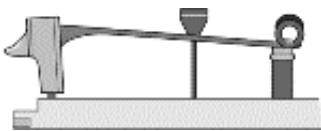


Prellmechanik action without escapement mechanism from an anonymous south German...

Whereas Cristofori, the Silbermanns and the later piano makers of other schools sought to create a harpsichord capable of dynamic expression, the main thrust of German and Austrian piano building in the later part of the century seems to have been towards creating an instrument that would be like a louder clavichord (Austria, Germany and Scandinavia being virtually the only countries in which

the clavichord was still esteemed at this period). These German and Austrian pianos have a relatively clear singing tone and an extremely light touch (12–20 grams). The simplest of the so-called square models with the *Prellmechanik* show clearly the inspiration of their origin: all that separates them from the clavichord is the addition of a nut at the rear to determine the speaking length of the strings, and the replacement of the tangent by a hammer hinged to the back of the key. In the simple *Prellmechanik* most commonly (and apparently exclusively) used in square models, each of the hammer shanks is attached to its own key – either directly to the top or side (fig.3), or by a wooden or metal fork or block (the *Kapsel*) – with the hammer head towards the player. A point (the 'beak') on the opposite end of the hammer shank extends beyond the end of the key. This beak is stopped vertically either by the underside of the hitch-pin apron or by a fixed rail called the *Prelleiste*: as the back of the key rises, the hammer is thereby flipped upwards towards the string. As the distance from the tip of the beak to the hammer shank pivot is far shorter than the distance from the pivot to the hammer, the hammer ascends much more rapidly than does the back of the key. An adequate free-flight distance had to be left as there was no escapement mechanism to prevent the hammers from restriking the string or blocking and interrupting the tone. A significant number of these pianos had uncovered hammer heads, giving a harpsichord-like sound. Others had only a meagre covering of leather on the hammers.

The development of an individual escapement for the *Prellmechanik* is credited to Johann Andreas Stein (1728–92), a keyboard instrument maker in Augsburg. In some of Stein's instruments the labels are missing, altered or falsified, so there has been confusion in the dating of his earliest pianos. But some of the questionable instruments are also signed and dated with silver pencil on the underside of the soundboard (Latcham, D1998). The claviorgan, a combination of organ and piano made by Stein in 1781 (now in the Historiska Museum, Göteborg), is the oldest known dated piano with the *Prellmechanik* escapement. By 1777 a type of action with an escapement mechanism must have evolved sufficiently to satisfy Mozart when he visited Stein in Augsburg (Mozart complained of hammers jamming on other instruments). The harpsichord-piano of the same year, located now in the Museo Civico di Castelvecchio, Verona, has stationary mounted hammers while the individual escapement hoppers are hinged to the keys (*Zuggetriebe*; see Pfeiffer, C1948). The hammer heads are still uncovered.



Prellmechanik with escapement, believed to have been first used by...

In the developed *Prellmechanik* there is an individual hinged escapement hopper for each key instead of a stationary rail serving all keys. Each hopper has a notch into which the beak of the hammer shank fits, and each hopper has its own return spring (fig.4 [not available online]). As the key is depressed, the beak is caught by the top of the notch in the escapement hopper, lifting the hammer.

The combined arcs traversed by the key and the hammer shank cause the beak to withdraw from the escapement hopper and slip free just before the hammer meets the string, after which it is free to fall back to its rest position. When the key is released, the beak slides down the face of the escapement hopper back into the notch.

An important feature in such pianos is the extremely small and light hammers (see fig.19 below); their thin leather covering (instead of felt) is vital to these instruments' clavichord-like delicacy of articulation and nuance. Typically, the Stein action has either round hollow hammers similar to those of the Silbermanns but made of barberrywood (see Koster and others, C1994), or short

solid hammers usually made of pearwood (the *Kapseln* are also of felt-covered pearwood). Surviving Stein instruments from 1781 to 1783 all have the round hollow hammers, as do the instruments of J.D. Schiedmayer, who worked for Stein from 1778 to 1781. In Stein's instruments each key has a post supporting the hammer in a rest position above the level of the keys; this rest post is provided with a soft cloth which helps absorb the shock of the returning hammers thus preventing them from rebounding, a useful function in the absence of a true back check. To place the action in its proper position (behind the wrest plank in a grand) a 'sled' or drawer about 5 cm high is slipped under the action. The keyboard itself is generally of spruce or lime with ebony key slips for the naturals and with sharps of dyed pearwood topped with bone or ivory.

The individual dampers are fitted into a rack above the strings, which the player can raise by means of two joined knee levers under the keyboard; the clavichord of 1781 has hand stops for this purpose. Some of Stein's instruments have hand levers for other stops, but these are probably not original. On the outside the Stein case has a double curved bentside. Inside, the liners for the soundboard are made of solid wood and reach down to the baseboard. The frame is braced by two or three members perpendicular to the spine (the straight side of the instrument) and two or three diagonal supports. The case is closed at the bottom by a thick baseboard with the grain running parallel to the straight part of the bentside, and is usually veneered in plain walnut or cherry with a band of moulding around the lower edge. The soundboards of Stein's instruments are of quarter-sawn spruce, graduated in thickness and with a system of ribbing glued to the underside. Typical of Stein's ribbing systems is the position of the long diagonal rib, glued very close to the bridge. The compass of all Stein's pianos is five octaves, *F* to *f*". Some variations of detail and design in Stein's late instruments, e.g. the shape of the action parts and the use of gap spacers, wire-guided dampers, and slides to raise the action, were continued by his children until 1805.

It has not yet been discovered how knowledge of Cristofori's hammer action reached Vienna. The Viennese court account books of 1763 record a fee to Johann Baptist Schmidt 'for a concert on the fortipiano', the first documented usage of this term (this may have been a square piano): Quite a number of the oldest extant Viennese pianos have the *Stossmechanik* rather than Stein's *Prellmechanik* (Huber, D1991); Stein was probably not using his new mechanisms before 1780 (Latham, D1993, D1998). A number of piano makers came to Austria from South Germany and Bohemia in the later 18th century, most notable among them Anton Walter (1752–1826). In about 1782 W.A. Mozart bought a piano from Walter (Rampe, D1995). Certain alterations to the action suggest that this piano and two other instruments of Walter's earliest creative period could originally have had a *Stossmechanik* action.

In the mid-1780s Walter developed the *Prellmechanik* further, departing significantly from Stein's model (Luithlein, F1954; Rück, D1955). The escapement hoppers are tilted forward with the effect that the hammers, which are longer and larger and rest close to the level of the key (there are no rest posts as such), decelerate as they rise, and their beaks gradually slip out from the notches in the hoppers. A movable rail adjusts the point at which the beak finally leaves the notch. There is a sprung back-check rail to prevent the hammers from rebounding. After about 1785 brass *Kapseln* were used in Vienna as well as the wooden felt-covered *Kapseln* of the Stein action (the two types continued in parallel use for some 20 years). The double-pointed iron axle of the hammer fits into two shallow sockets in a springy, U-shaped fork of brass. This invention, attributed to the Viennese piano maker Johann Jakob Seydel [Seidel] (1759–1806), allowed more precise and relatively frictionless movement of the hammer shank and greater efficiency of manufacture (for illustration of a later version of this action, see fig.18 below). Both Stein's and Walter's actions are capable of great expressivity and dynamic variation, but Walter's, with its check rail, could produce greater volume, suiting the fashion for virtuoso performance. In expressive power, subtlety and the production of swiftly repeated notes, if not in volume, the *Prellmechanik* with back check (described in the 19th century as the 'Viennese action'; see §5 below) was undoubtedly superior to the various *Stossmechanik* actions then being built.

The cases of these pianos at first resembled those of south German and Austrian harpsichords. The body was usually plain, made of native woods (walnut, cherry, oak, yew), sometimes solid wood and sometimes veneered. The naturals usually had ebony key slips and the sharps were dyed black, with slips of bone or ivory. From the mid-1790s some keyboards had ivory or bone slips on the naturals as well; the cases of these instruments were usually of mahogany, and in more expensive instruments were decorated with brass appliqué work, partly gilded. In some instruments (e.g. by Ignatz Kober, Johann Jakob Könnicke, L. Gress) the soundboard has a rose.

The compass was usually F' to f''' or g''' ; the treble register was extended only towards the turn of the century. Most pianos were double-strung in the bass and middle registers, with the treble triple-strung from about a' to c'' , while most square pianos were double-strung throughout. Strings were usually of soft low-carbon phosphorous steel ('iron strings') with brass in the lowest octave. Many makers used 'copper' (red brass) for the lowest notes. The low notes of square pianos usually had overspun strings made of silvered, tinned or zinc-covered copper wire on a brass or iron core. Contemporary sources and significant differences in scaling, as well as several preserved clavichords, provide evidence that pianos were built (or played) in different pitches: low chamber pitch ($a' = \text{c}405\text{--}25$), high chamber pitch ($a' = \text{c}430\text{--}40$), and choir pitch ($a' = \text{c}450\text{--}65$).

Both grand and square pianos usually had one or more devices to change tone colour, known as mutations or stops. Sometimes, especially in earlier instruments, they were divided into bass and treble areas. The *forte* stop raises all the dampers. The *piano* or mute stop (or *sourdine*) inserts a strip of cloth between strings and hammers, producing a slightly muted colour. The lute or harp stop (rarer) presses a leather or fabric-covered strip against the strings close to the bridge, the effect being a lute-like sound that quickly dies away. The stops could be operated by hand, as on an organ, or by knee levers (square pianos usually used hand levers). At the end of the 1790s the so-called bassoon stop (probably originating in Prague) became fashionable. It was a strip of wood supporting a roll of paper, silk or extremely thin parchment, pressed against the bass strings to give them a buzzing sound. The kind of sound expected by instrument makers, musicians and audiences was clearly not firmly established at first, and tone colours of different instruments might resemble those of the clavichord, harpsichord, dulcimer, harp or pantaleon. Many instruments of the period had hammer heads without leather covers, the result being a very bright, harpsichord-like sound. Until the end of the 18th century the central concern of piano makers was clearly to build an action which would be easy to operate, subtle and capable of swift repetition of notes, with a reliable damping system, and to balance a rounded bass with good tone colour against an expressive, not too weak treble. Volume and carrying power do not seem to have been a priority. Besides iconographical evidence, this is indicated by the fact that a great majority of preserved 18th-century south German and Austrian pianos originally had no sticks to hold their lids open. Grand pianos were usually played with the lid closed; or when performances were given on a larger scale the entire lid was removed (Huber, G1987). The distributed and importance of square pianos should not be underestimated; for average musicians and amateurs they were easier to acquire than the far more expensive grand pianos, which must have been largely reserved for the aristocracy until the last quarter of the 18th century.

At the end of the 18th century some 60 piano makers and organ builders were active in Vienna. Instruments made in the tradition of J.A. Stein should be regarded as the typical pianos of the early Viennese Classical period, in particular those made by his two children, Nannette Stein (later Streicher) and Matthäus Andreas Stein (known as André Stein), who moved their workshop from Augsburg to Vienna in 1794 (Frère & Soeur Stein à Vienne). German makers of note include Stein's pupil J.D. Schiedmayer in Erlangen; J.L. Dulcken (ii) in Munich; the brothers Johann Gottfried (1736–1808) and Johann Wilhelm Gräbner (1737–98) in Dresden; and C.F.W. Lemme (1747–1808) and J.J. Könnicke (1756–1811) in Brunswick (Könnicke moved to Vienna in 1790). J.E. Schmidt (1757–1804), who was appointed court organ builder in Salzburg in 1785 on the recommendation of Leopold Mozart, and Ferdinand Hofmann (1756–1829) also worked in the Stein tradition in Vienna. Notable among the followers of Anton Walter were his pupil Kaspar Katholnik (1763–1829) and Michael Rosenberger (1766–1832). There was a third Viennese tradition of piano making, its most important maker being Ignatz Kober (c1755–1813). Features of his instruments include very precisely made *Stossmechanik* actions and a rose on the soundboard. The oldest preserved signed and dated Viennese piano was made in 1787 (Kunsthistorisches Museum, Vienna) by Gottfried Mallek (1731–98).

Philip R. Belt, Maribel Meisel/Alfons Huber

4. England and France to 1800.

Before 1765 the pianoforte did not occupy a prominent position in France or Britain. Nevertheless, scattered documentary sources indicate that, as in northern Germany, some early examples were heard and admired during the 1730s and 40s. Writing to his brother James from London on 17

May 1740, Thomas Harris (1712–85) reported that Handel had ‘played finely on the Piano-forte’ the day before (Dunhill, G1995). As he did not explain what this instrument was, we may conclude that both men had seen it previously. Charles Jennens, Handel’s librettist for *Messiah*, owned a ‘Piano-forte Harpsichord’, sent from Florence as early as 1732, together with ‘a book of Sonatas compos’d purposely for the Piano forte’, presumably Giustini’s. In about 1740 Samuel Crisp (1706–83) returned from Italy with a pianoforte made in Rome by an Englishman named Wood. In 1747 Charles Burney played it at the country home of his new patron Fulke Greville. Listeners were delighted by its tone, and its ‘magnificent and new effect’ of light and shade produced simply ‘by the finger’. It was, however, severely limited by poor repetition. ‘Nothing quick could be executed upon it’, wrote Burney, but he perfected the performance of slow and solemn pieces, and some ‘pathetic strains [from] Italian operas’, exciting ‘wonder and delight in the hearers’. Greville liked it so much that he prevailed on Crisp to sell it to him for 100 guineas – about double the price of a new harpsichord. Roger Plenius, a London harpsichord maker, made an improved version about 1750 but met with little encouragement; he was declared bankrupt in 1756. On 27 June 1755 the Rev. William Mason wrote from Hanover to the poet Thomas Gray: ‘I bought at Hamburg such a Pianoforte, and so cheap! It is a Harpsichord too, of 2 Unisons, and the Jacks serve as Mutes when the Pianoforte is played by the cleverest Mechanism imaginable’. The maker’s name is not known, but Friedrich Neubauer was advertising such combination instruments in Hamburg in 1754, as well as clavichords and harpsichords, and hammer-action instruments called *Pantelong*, evidently inspired by Hebenstreit’s giant dulcimer (known as pantaleon). By 1758 Neubauer had moved to London where he advertised the same instruments, dropping the name ‘Pantelong’ in favour of ‘Piano forte’. Thus hammer instruments of both German and Italian designs were seen in London before 1760. Nevertheless, in an environment dominated by the harpsichord, pianos were comparatively scarce and undeveloped, and had little influence on repertory or performance.

In Paris there was a similarly slow response. In 1716 Jean Marius presented plans to the Académie des Sciences for a *clavecin à maillets*. But the originality of his invention was successfully challenged in the courts and no such instrument is known to have been completed by Marius. In 1759 the academy saw another novel harpsichord, made by ‘Weltman’ (possibly the Dutch maker Andries Veltman), containing both conventional jacks and a hammer action; again there was no discernible response. After Gottfried Silbermann’s death (Dresden, 1753) his pianoforte design was perpetuated by his nephew Johann Heinrich Silbermann in Strasbourg. The latter’s instruments, described in Paris in *L’avant coureur* of 6 April 1761, were bichord grands of five octaves, with hand-operated stops to raise the dampers. The prodigious asking price – 1500 livres – would have deterred all but the wealthiest patrons; reportedly there were only four of these *piano e forte clavecins* in Paris. Schobert and Eckard probably played on such instruments when the opportunity arose. The preface of Eckard’s Sonatas op.1 (1763) explains that dynamic markings appear so as to make the music ‘equally useful to performers on the harpsichord, clavichord or pianoforte’.

The tardy acceptance of the piano was soon to be rapidly accelerated by events in London. In September 1761 Princess Charlotte of Mecklenburg-Strelitz became queen of England, aged 17. Her enthusiastic harpsichord playing and penchant for modern music led to the selection of J.C. Bach as her music master by 1763. Burney reported that after J.C. Bach’s arrival in London to prepare works for the opera season of 1762–3, ‘all the harpsichord makers tried their mechanical powers at piano-fortes, but their first attempts were always on the large size till Zumpé ... constructed small piano-fortes of the shape and size of the virginal’. Johannes Zumpe (1726–90) emigrated to London around 1750 and studied instrument making with Burkat Shudi. He set up his own workshop in 1761, at first supplying metal-strung English guitars, but then turned to pianos. His earliest surviving square pianos date from 1766.

In the same year, on the title page of J.C. Bach’s six keyboard sonatas op.5, Bach first nominated the pianoforte as an alternative to the harpsichord. Zumpe’s instruments were enthusiastically endorsed by Bach, Burney, Mason and, by association, the queen herself. For several decades this type of square piano was much the most popular form of pianoforte throughout Europe and North America. Burney attributed this to its sweet tone, good repetition, compact size and low price: the instruments sold at 16 to 18 guineas, about a third of the cost of a harpsichord.

varies according to the depth of the key dip when the hammer hits the string; therefore, when the total key dip was increased as the Viennese action got heavier, this inconsistency was accentuated. However, Pfeiffer (C1948) considered that the allegedly poor capacity for repetition of the Viennese action was much exaggerated. On the same subject, Joseph Fischhof (C1853) had already commented that repetition was to be performed by the pianist, not the piano maker. Viennese pianos were still produced in the second half of the 19th century but were discontinued as a standard model by Bösendorfer in 1909; some were made to order by Bösendorfer during the next decade and a few makers of less expensive instruments in Vienna continued to use the developed *Prellmechanik* even later. In the end the decline of the Viennese action was due to changing aesthetic paradigms in playing as well as building pianos. Viennese pianos required both a sensitive, sympathetic pianist of the old school, and a piano maker who was a skilful technician and worked with intuitive feeling, since the action was much harder to adjust with precision than a modern action with its many adjusting screws.

The modern instrument, which has become more of a machine, is also better suited to modern piano playing, which calls for great volume and precision. In this connection it is worth noting that Viennese piano makers were particularly reluctant to expand their firms (Bösendorfer, F1898), so that there was hardly any industrial manufacturing of instruments on a large scale in Austria. Viennese piano-building stands for a traditional craftsmanlike approach, and 19th-century industrialization was foreign to it. However, several Viennese piano makers in the second half of the 19th century did endeavour to comply with the west European standard. The most important firms of this period were J.B. Streicher & Sohn, Ludwig Bösendorfer, J.M. Schweighofer's Söhne and Friedrich Ehrbar. As well as making the usual Viennese instruments, all these firms also built pianos with the English action, and even with a double repeating action. Innovations such as the cross-strung solid-cast frame, and the double scale deriving from the research of the physicist Helmholtz, were already being introduced in Vienna about 1875 (Schelle, B1873; *Die Pianoforte von Schweighofer*, 1892).

In the wake of the harpsichord revival of the 20th century there was from World War II a new interest in the early models of piano with *Prellmechanik* as proper instruments for the stylistic investigation and historically accurate performance of the Classical masters such as Haydn, Mozart and Beethoven. Replicas of pianos by Stein and his contemporaries have been produced by Hugh Gough and Adlam-Burnett (England), Philip Belt (USA), Martin Scholz (Switzerland), Rück and Neupert (Germany) and others, and these have promoted a widespread recognition of the virtues of the 18th-century Viennese piano for its own repertory. By the late 1970s progress in reconstructing contemporaneous orchestral instruments and their playing techniques made it feasible to perform a Mozart concerto with instruments resembling the originals.

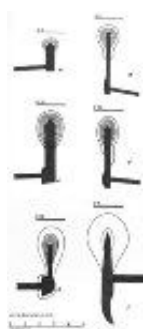
In the early 1980s makers such as Robert Smith and Margaret Hood (USA) and Neupert began producing replicas of the larger Viennese pianos of Graf, Streicher and Dulcken. Since the early 1990s Christopher Clark (Cluny, France) and Paul McNulty (Divišov, Czech Republic) have also become famous for the high standard of their instruments. Many such builders concentrate on using the same materials and techniques as the original makers. These instruments, as well as the restorations of E.M. Frederick, Edward Swenson (both USA), Gert Hecher and Albrecht Czernin (Austria) and others, provide an opportunity to extend keyboard performing practice to include the piano repertory of the 19th century.

Philip R. Belt, Maribel Meisel/Gert Hecher

6. England and France, 1800–60.

During the first half of the 19th century English and French instrument makers transformed their low-tensioned, light-action fortepianos of five or five and a half octaves into massively powerful, seven-octave instruments closely resembling the modern piano. Prominent London manufacturers of the period included the firms of Broadwood, Clementi (later Collard & Collard), Kirkman and Stodart; in Paris, the Erard and Pleyel firms were dominant. Erard, which also ran a successful London branch, was perhaps the single most important source of innovation among these makers.

In the quest for greater power and dynamic range, which was the driving force behind these changes, string diameters and tensions were progressively increased. On the grand pianos of John Broadwood about 1801, the iron wire used for the note *c* is under a tension of about 10 kg per string – virtually the same as that used in Zumpe's square pianos 30 years earlier. But by 1815, thicker wire was used in both grands and squares, with a tension of about 15 kg per string for *c*. Thereafter the increase was inexorable: 24 kg by 1825, 42 kg by 1850. Such high tensions were made possible only by using harder steel wire and ever-stronger forms of bracing in the case construction, progressing towards the full iron frame.



Comparison between six piano hammers and strings (all sounding the...

To match these heavier strings the weight of the hammers was more than doubled (fig.11). The more powerful, richer sonorities of the later pianos are directly related to energy input, which cannot be manufactured inside the instrument, but must come ultimately from the player's fingers. This has a profound effect on the touch, illustrated by comparing the minimum weight required to sound a note on instruments made 60 years apart. Typically, an English grand of around 1800 requires only 34 grams to sound *c*, but on a piano of 1860 the same note requires 80 grams. To ease the burden on the player, piano makers were compelled to reduce the gearing ratio between the finger and the hammer head. Until about 1810 English piano keys had a touch depth of about 7.5 mm, but by

1845 this had increased to 9 mm and by 1860 to 10 mm. This depth of movement required taller sharps, while the natural key heads were lengthened from 40 mm to 50 mm, encouraging a more vigorous attack with extended fingers rather than the quiet hand and curved finger techniques of the 18th century.

The extra tensile strength obtained from hardened steel strings, together with the physical properties of much tauter wire, demanded softer and thicker hammer coverings to suppress the undesirable inharmonicities produced by prominent upper partials. Many materials were tried, including woven cloth or matted fur applied over the traditional layers of leather, but compressed felt gave the best results. This led to the production of specialist hammer felts and new arts of voicing (or 'toning') the hammers. The *fortissimo* became much more powerful than before, and the *pianissimo* quieter by contrast, but there was some loss in articulation, especially noticeable in the lower notes where the tone develops more slowly.



Erard repetition action after the English patent drawing of 1821; ...

Sébastien ERARD and his nephew Pierre introduced many successful solutions to the problems created by the heavier and deeper touch, and their numerous patents of this period also chronicle the ways in which piano construction was modified so as to bear hugely augmented loads. As early as 1808 Sébastien Erard's patent drawings show a downward-sloping wrest plank with agraffes (metal staples, one for each note, secured to the wrest plank to provide a bearing for the strings which pass underneath

and at the same time defining one end of the speaking-length of each string). In this arrangement the wrest plank is stronger and the hammer blow hits the strings against their bearing, which prevents their displacement and, together with the equalized unison string lengths introduced by Broadwood, helps to preserve the tuning. But the main focus of the 1808 patent was an entirely new action: Erard's *mécanisme à étrier*. In this the intermediate lever (omitted in English grand actions) was reintroduced, but adapted to operate a downward-pulling action on a rear extension of the hammer butt. After escapement the 'stirrup mechanism' quickly re-engages the hammer so that notes may be repeated with small motions of the key. This ability to repeat notes when the key was only partially returned became increasingly important as more massive hammers produced a heavier touch. English makers paid insufficient attention to these developments, most preferring the simplicity and reliability of the action invented by Backers. In December 1821, just months before the 1808 patent expired, Pierre Erard filed a patent for another repetition action (fig.12; the patent was approved the following year). This one, with only minor modifications, provides the basis of all modern grand piano actions. After escapement, the hammer falls away by only a short distance, about 10 mm below the strings, where it rests on a sprung repetition lever. As the finger releases the key the intervention of this lever allows the hopper to re-engage the hammer quickly; so that for repeated notes it is not necessary that the key return to its original position. One of the secondary results of higher string tensions can be seen in Erard's change to under-dampers which, aided by a spring, press firmly against the strings to quell their energetic

vibrations.



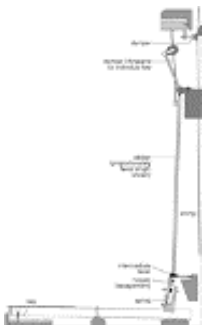
Iron bracing scheme patented by James Shudi Broadwood in 1827

The construction of an entirely wooden case that would resist the enormous aggregate forces of the string tension demanded ever more drastic buttressing. For this reason there was much interest in down-striking actions because these allowed the case to have bulky wooden struts passing right through the instrument behind the soundboard. However, the better reliability of up-striking actions was ultimately persuasive. Early six-octave English grands used five steel arches to bridge the gap between wrest plank and belly rail – as in Beethoven's Broadwood of 1817. That instrument may be seen

as the end of the line for piano development without metal framing. In 1820 James Thom and William Allen jointly patented a 'compensation frame', in which brass and steel tubes were placed above the strings to connect the wrest plank to a metal hitch-pin plate along the bentside. Part of their idea was to allow for slight movements of the hitch-pin plate, and to use the expansion and contraction of the tubes under changing temperatures to push or pull the frame, so maintaining the original string tension. Their system was very effective in practice. Grands made under this patent by William Stodart were vastly more stable at high tension than any previous piano. Other makers responded with more modest schemes using three to five steel struts (fig.13). In most English square pianos after 1825 a metal hitch-pin plate on the right was braced against the wrest plank by a single strut. In Erard's 1825 patent the grand's wrest plank is reinforced with a steel plate fastened underneath, and struts bear against a metal plate at the bentside through adjustable screws.

Facility of repetition was of paramount importance to French makers, yet many of their square pianos from the early part of the 19th century feature a simple two-lever action without escapement. With this mechanism rapid reiteration was possible with practice, but as hammers increased in weight it became more difficult to prevent rebounds and double strikes. London makers, using the more subtle escapement action of fig.11, countered this problem by adding a wire-mounted check – before 1830 on expensive models. Erard likewise added a check; the firm designed and patented a succession of innovatory actions for square pianos between 1820 and 1840, but few of these found their way into regular production. Many French square pianos employed triple stringing rather than augmenting the tone with heavier bichords as favoured in England.

Once again, as the 14-year term for the grand repetition action expired, Erard applied for another, dated December 1835, effectively preventing British rivals from using a wide selection of useful innovations. In all this time Broadwood had taken out only three quite trivial patents. It was not until the Great Exhibition of 1851 in London, when the jury awarded its most prestigious medal to Erard, that Broadwood's complacency was exposed. As the world's largest and most commercially successful manufacturers they were aggrieved at the decision, though many friends rallied to defend them, claiming that Broadwood's tone was superior – a notoriously subjective matter. (A grand piano of 1855 by Erard is shown in fig.14 [not available online].)



Sticker action typical of English cabinet pianos, c1810–60

Among British manufacturers the square piano declined rapidly after 1840 as improved uprights won approval for domestic use. In 1810 more than 80% of pianos produced in London had been squares, but by 1850 this had dwindled to less than 7%. Part of the reason for the square's demise was its increasing size: as the compass increased from five-octaves to seven such instruments inevitably grew not only longer but proportionately wider and deeper, becoming massively cumbersome pieces of furniture. The upright instrument provided an alternative. Most uprights of the period had the soundboard and strings raised above the keys – chiefly for acoustical reasons. 'Upright grands' up to 8.5 feet (2.66 m) tall incorporated the structure and action of the horizontal grand with

minimal modification, the hammers striking from the back. More compact forms were basically square pianos raised vertically, using diagonal stringing; for these William Southwell designed the 'sticker action'. The first cabinet uprights, in which the strings descend to within a small distance of the floor, were five-octave instruments patented in 1800 by JOHN ISAAC HAWKINS, an Englishman living in Philadelphia (see also UPRIGHT PIANOFORTE). Just over four feet high, his absurdly named 'Portable Grand Piano-forte' was in some technical respects far ahead of its

time. But Hawkins was primarily an engineer, not a musical instrument maker; he paid little attention to the touch and the pianos were not a success. Southwell's sticker action (fig.15) proved useful in tall cabinet uprights (1820–50) which, like Hawkins's piano, had the wrest plank at the top. Even with an escapement such actions were not equal to *prestissimo* playing, but the structural stability of the cabinet form, in which the action could be placed entirely in front of the strings, was so superior that other forms were soon obsolete. The shortcomings of the upright action were addressed most successfully by Robert Wornum, who developed the 'tape-check' mechanism (fig.16). A light brass spring, connected to the hammer butt by a linen tape, acquires tension as the hammer approaches the strings and tweaks it away from the strings promptly, preventing rebounds or dwelling on the string. With minor modifications to improve reliability in the escapement, and with relocation of the dampers, Wornum's invention became the prototype for modern upright actions.



Cottage piano by Clementi & Co., London, c1825 (private collection)

To reduce the height of these front-striking uprights to the absolute minimum a simple diagonal disposition of the strings was adopted, as advocated by Thomas Loud (1802) and seen in Wornum's early instruments. But in 1828 Jean Henri Pape in Paris devised the prophetic concept of overstringing, placing the bass strings on a separate bridge in the otherwise unused area of the soundboard at the bottom right beyond the tenor bridge. The bass strings passed over the tenor in a system that has since worked well in grands. In Pape's fashionable console pianos of around 1840 the top of the case was only slightly higher than the keys, an arrangement made possible by having the rear of the keys cranked downwards.

However, the compactness of such designs was achieved at the cost of some loss in sonority and in the reliability of the action. From 1835 to 1860 the most popular form of domestic instrument was the dependable 'cottage piano', a cabinet piano of modest height (one of c1825 is shown in fig.17).

Changing perceptions on the use of the sustaining tone and mutation stops were partly conditioned by the increasing power of the piano throughout this period. Beethoven's Erard grand, presented to him by the maker in 1803, had four pedals typical of French instruments up to 1825. The harp pedal produced a *pizzicato* sound that could be used with or without sustaining effects. (When not sustained, the tone was usually called 'lute'.) The moderator produced a muffled tone by interposing cloth tabs between the hammers and strings. The *una corda*, which Louis Adam (1804) recommended in conjunction with the fourth, sustaining pedal as the *jeu céleste*, was commended by Beethoven to Viennese makers. Parisian square pianos often had a **BASSOON STOP**, operating only from middle C downwards, whose buzzing sound added rhythmic impulse to dance music. Pianos from London were usually equipped simply with two pedals, as found on modern instruments. On early 19th-century grands and uprights the left pedal provided a genuine *una corda* or *due corde* throughout the compass, but this was often compromised after 1830 when the tenor and bass were not always tricords. The right pedal lifted the dampers. The changing use of this pedal, in consequence of the stronger reverberation of more tautly strung pianos, caused many makers to seek ways of providing selective sustaining mechanisms. The simplest was Broadwoods' split pedal, which could lift the bass and treble dampers separately, while the most complicated and least copied was the **SOSTENUTO PEDAL** pioneered by Boisselot and exhibited in Paris in 1844. In spite of the plethora of other mechanical aids, when felt-covered hammers became the norm after 1830, most pianos were provided only with the keyboard-shifting 'soft' pedal and the damper-lifting **SUSTAINING PEDAL**.

Michael Cole

7. Spain, 1745–1850.

The earliest extant Spanish piano, dating from about 1745, was made in Seville by Francisco Pérez Mirabal. Whilst the action resembles Cristofori's 1720 model with a non-inverted wrest plank, the case has a double-curve bentside and other features of construction more typical of Sevillian harpsichord-making. Its compass is G^1-d''' . Unusually, it possesses trichord stringing where one set of strings could be silenced with a hand-operated stop of leather pads. Two other,

unsigned, Spanish pianos with a Florentine-style action are known: a *G'-g* instrument from the Pérez Mirabal workshop, and a *C-d* instrument with bichord stringing whose case suggests a different school of construction. The early presence of pianos in Seville may be related in some way to the marriage of the Portuguese infanta Maria Bárbara and the Spanish crown prince Fernando in 1729 and to the Spanish court's residence in Andalusia during the following four and a half years. Maria Bárbara brought her music teacher, Domenico Scarlatti, with her to Spain. It appears probable that both were familiar with the piano and during the early years of her marriage the princess may already have owned a Florentine instrument that could have inspired Pérez Mirabal to develop similar instruments. None of the grand pianos built by Mirabal's successor in Seville, Juan del Mármol, is known to have survived; however a number of his square pianos, made from the 1780s onwards in the English style, are extant. Some of his instruments were exported to Latin America and a Juan de Mármol (father or son) emigrated to Mexico at the end of the century, as did Adam Miller, a German who moved to Mexico after working in Madrid. Information on piano building in Madrid prior to 1780 is not available. As far as the royal harpsichord maker Diego Fernández is concerned, it is not clear whether he made such instruments himself or whether a few of his harpsichords were later converted into pianos.

Grand pianos (Sp. *pianos de cola*) were usually known as *clavicordios* (or *claves*) *de piano* or *de martillos* (i.e. 'piano- or hammer-harpsichords') during the 18th century. Square pianos were called *fortepianos* or *pianos fortes* (later known as *pianos cuadrilongos* and most recently as *pianos de mesa*). The term *fortepiano* seems to have been introduced together with the first such instruments from England during the 1770s. In the following decades the most up-to-date models were imported from England and Madrid makers advertised themselves as exponents of the English style. Foremost of these was FRANCISCO FLÓREZ, a court piano maker who became familiar with the work of English makers, including that of J.J. Merlin, during a year-long stay in England. His younger rival and successor in the royal favour, FRANCISCO FERNÁNDEZ, at first followed the English style but later tried to found a Spanish school of construction using native woods, while at the same time following developments abroad, particularly in France. Other Madrid piano makers in the first half of the 19th century showed little originality. An exception was the immigrant Jan Hosseschrueders, a Dutch carpenter who founded a firm in Madrid in 1814, later known as HAZEN and still in operation today. Hosseschrueders patented a transposing piano in about 1824.

Little research has been carried out on the piano in other regions of Spain. It appears, however, that at the beginning of the 19th century German influence was uppermost in Catalonia. Many Catalan square pianos are to be found incorporating knee levers and a *Prellmechanik* (see §§3 and 5) comprising a *Prelleiste*, hammers held in brass *Kapseln*, but no back checks. In 1848 the French firm of Boisselot opened a branch in Barcelona (later owned by the Spanish firm of Bernareggi). This was a symptom of the increasing popularity of French instruments in Spain. As the 19th century progressed few Spanish firms could compete directly with the large factories in other countries and many smaller Spanish firms came to rely on cheaper parts from abroad for assembly in Spain.

Beryl Kenyon de Pascual

8. North America to 1860.

Pianos were used and made in North America by the 1770s. The earliest known reference to a piano there is a notice in the *New-York Gazette and Weekly Mercury* of 17 September 1770 listing a 'fortepiano' for sale by the Englishman David Propert; in Boston, Propert advertised that he taught the piano and in 1771 performed 'some select pieces on the forte piano', at the Concert Hall. In the same year in Virginia Thomas Jefferson and Robert Carter bought pianos from London. In 1772 John Scheiuble [Shyebli] announced in New York that he made and repaired pianos, and in 1774 he advertised for sale 'one hammer spinnet', which he may have made himself. Another German craftsman, John [Johann] Behrent, usually credited with making the first piano manufactured in North America, advertised in Philadelphia in 1775 that he had made an instrument 'by the name of Piano Forte, of Mahogany, in the manner of an harpsichord, with hammers and several changes'. Although both manufacture and emigration diminished during the Revolutionary War, from the mid-1780s many builders emigrated from Europe to the USA,

among them Thomas Dodds (active in New York from 1785), Charles Albrecht (Philadelphia, c1785), Charles Taws (New York, 1786; Philadelphia, 1787) and John Geib (New York, 1797), who claimed by 1800 to have built 4910 pianofortes. In Milton, Massachusetts, the American-born Benjamin Crehore was building pianos by the 1790s. The type most often played and owned by Americans was the square piano, which remained in favour until the 1880s. The typical early square had wooden framing, a range of five to five and a half octaves ($F-c'''$), English action (although Albrecht made some with German action), and changes in registration activated by hand stops.

As early as 1792 Dodds & Claus noted the need to prepare their wood 'to stand the effect of our climate', a prime concern of American builders throughout most of the 19th century. **JOHN ISAAC HAWKINS**, an English civil engineer working in Philadelphia, included an iron frame and iron bracing rods in his ingenious 1800 patent for a small upright piano. Although his invention did not succeed musically, it represents one of the earliest attempts to use iron to withstand climatic changes. In 1825 Alpheus Babcock, a Boston maker who had worked with Crehore, was the first to be issued a patent (17 December 1825) for a one-piece metal frame, which he claimed would be 'stronger and more durable than a wooden frame or case' and, because the strings and metal frame would expand or contract equally, would prevent the instrument being 'put out of tune by any alteration in the temperature of the air'. He fitted this frame in a piano typical of the late 1820s, a mahogany square with decorative stencilling, two pedals and a compass of six octaves ($F-f'''$); only two Babcock squares with an iron frame are extant. Many builders, especially in New York and Baltimore, opposed the iron frame, claiming that it resulted in a thin and nasal tone quality. Instead, many used the heavy wooden bracing and a solid five-inch (12.7 cm) wooden bottom for stability in tuning. But by the 1840s, wooden framing alone was not strong enough to withstand the enormous tension required by the piano's expanded compass (seven octaves, $A''-a'''$) and the rigours of American climatic extremes.

By the 1830s American makers of square pianos were using the Erard repetition action. In 1840 the Boston piano maker Jonas Chickering, with whom Babcock worked from 1837 to 1842, patented a metal frame with a cast-iron bridge for a square piano, and in 1843 he patented a one-piece metal frame for grands. He was the first to devise a successful method of manufacturing and selling pianos with metal frames and was the first major American builder to make grand pianos, for which he won special notice at the Great Exhibition in London (1851). Metal frames and felt-covered hammers made American squares characteristically heavy and sonorous instruments. The Chickering factory, with about 300 workers, made over 10% of the 9000 pianos produced in the USA in 1851. After a fire destroyed the factory in late 1852 the firm built a vast new factory and by the 1860s it employed over 500 workers. The Chickering firm set the standard for the American piano industry: production of high-quality pianos with metal frames, an extensive steam-powered factory operation whose workers developed highly specialized skills, an energetic sales programme, and support for musical events and performers characterized its approach.

In 1853, the year of Jonas Chickering's death, the Steinway firm was established in New York; within a decade it had equalled the Chickering firm in production and prestige. Like Chickering, the firm designed pianos with metal frames, patenting in 1859 a new overstringing arrangement for the grand piano which transformed the sound of the instrument and was eventually adopted by manufacturers throughout the world (see also §9 below). The demand for pianos grew throughout the century. According to statistics gathered by Loesser, Ehrlich and Dolge, one in every 4800 Americans bought a new piano in 1829; by 1851 the figure had risen to one in 2777, and by 1870 to one in 1540.

Cynthia Adams Hoover

9. 1860–1915.

The great change in the period from 1860 to World War I was the shift in piano manufacture from the craft shop to a factory system. Manufacturers before this time, such as Broadwood, the largest in the world with more than 300 employees, used no machinery and achieved virtually no economies of large-scale production. The typical small craft shop used labour-intensive methods

to make a few instruments each year. The spread of factories brought a tremendous growth in piano production, making much less expensive instruments available to more modest households. The greatest change of this type took place in the USA, where production, as shown in Table 1, increased by 15 times between 1870 and 1910. Germany's output increased eight times and Britain's three times, while France's production rose only about 20%. It has been estimated that, based on comparative income levels, the cost of pianos approximately halved from 1850 to the end of the century. Such growth suggests that the second half of the century saw the actualization of aspirations often expressed in the first half: that even the most modest cottage might have a piano on which the greatest music would be played, that the piano would become the household's altar, the drawing-room's orchestra, the centre and focus of the concert hall. Pianists continued to be leading stars of the musical world. International tours by Rubinstein, Bülow, Paderewski and others continued the tradition begun by such pianists as Liszt, Thalberg and Clara Schumann, bringing the highest realms of pianism to ever-greater numbers of people.

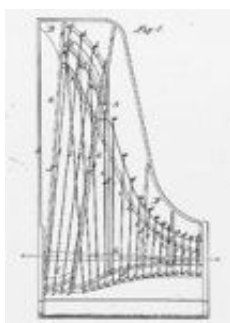
1. Estimates of piano production, 1870–1970 (in thousands)

TABLE 1: Estimates of piano production, 1870–1980 (in thousands)

Year	Britain	France	Germany	USA	Japan	USSR	Korea	
c1870	25	21	15	24				
c1890	50	20	70	72				
c1910	75	25	120	370		10		
c1930	50	20	20	120	2			
c1935	55	20	4	61	4			
			W	E				
c1960	19	2	16	10	160	48	88	
c1970	17	1	24	21	220	273	200	6
c1980	16	3	31	28	248	392	166	81

Note: estimates for 1960, 1970 and 1980 are taken from United Nations 'Growth of World Industry' and 'Yearbook of Industrial Statistics'; for earlier years see Ehrlich, 1976

This period also saw the beginnings of the standardization of what may justly be called the modern piano. Innovations of earlier years, such as overstringing, metal frames, felt hammer-coverings, refinements in actions, and the extension of the range from five octaves to seven or seven and a third, were combined and improved. Types and shapes of instruments were somewhat simplified as the century wore on. Large vertical pianos, such as cabinet pianos and 'giraffes', disappeared to be replaced by smaller uprights, standing only 4 to 5 feet (c1.2 to 1.5 m) in height. Such instruments were rapidly becoming the pianos of choice in middle-class European homes by the 1860s, and Broadwood made its last square in 1866. The Americans and Canadians retained their affection for the square for some decades longer. When, after 1865, Theodore Steinway began to concentrate production on the upright at the expense of the square, even workers in the factory objected, and American makers produced larger and larger squares as the century went along. But Steinway, which had made its first uprights in 1862, produced its last square in 1888, and in 1904 the association of American piano manufacturers gathered together all the squares they could find at their meeting in Atlantic City, New Jersey, and burnt them in a bonfire. Many squares survive as relics, but as the symbolism showed, their manufacture had essentially ceased.



Detail from Henry Steinway's patent for an overstrung piano, dated...

Steinway's 1859 patent for overstringing grand pianos (fig.18) produced what was essentially the modern grand (fig.19). It combined elements of earlier designs: the one-piece iron frame, patented for squares by Babcock, and for grands by Chickering (see §8 above); overstringing, which was pioneered by Jean Henri Pape for small uprights in the 1820s and was widely in use in squares; and the divided bridge, used by John Broadwood in the 18th century and refined in shape by Henry Steinway so that in combination with overstringing the bridge was brought closer to the centre of the soundboard, where vibrating efficiency was greater. Other design innovations came especially from the imagination of Theodore Steinway: the metal action frame, which prevented the warping of the action; the 'duplex scale', which proportioned the lengths of non-speaking parts of strings to the speaking parts in order to enhance the partials and the tone; and the laminated case, which was

stiffer and more durable and, by some accounts, improved the tone with more efficient reflection of vibrations across the soundboard. His brother Albert Steinway patented the sostenuto pedal, the middle pedal in most modern grands, which allowed the sustaining of notes whose dampers were already up when the pedal was depressed. Many of these elements were copied by other makers, though Europeans on the whole did not use the sostenuto pedal until after World War II. Some experiments in redesigning keyboards were carried out, notably Józef Wieniawski's double-keyboard instrument with the treble on the right in one and on the left in the other (1876), Ferdinand Clusam's concave keyboard (1907), and Paul von Janko's six-row, paired whole-tone keyboard (1882). These had only temporary success, Janko's more than the others. (See [KEYBOARD](#).)

The Erard action became the most common, though other types were in use. Bösendorfer continued to provide Viennese as well as Erard actions until about 1910. Such makers as Broadwood, Chickering, Pleyel and Blüthner used actions of their own design for quite a time, but by the early 20th century most of these had fallen out of use. Some makers, especially the English and French companies, held back from adopting the one-piece iron frame with overstringing, Broadwood making its first overstrung grand only in 1897 and Erard in 1901. Both continued to make straight-strung pianos after that. Blüthner used (throughout the 20th century) aliquot stringing in the top three octaves, with a fourth string above the others which vibrates sympathetically.

The die was cast in 1867, when at the Paris Exposition the piano competition was decisively won by the Americans. Steinway and Chickering argued inconclusively about which had taken the more important prize. Both were winners, and the outcome was dramatic. They were emulated especially by German makers and some Austrian firms. Encouraged by successes in other international exhibitions such as Philadelphia in 1876 and Amsterdam in 1883, the Americans were able by shrewd marketing and vigorous pursuit of export trade to persuade the public that what was widely called the 'American system' was now the norm. It maintained quality and lowered cost by using machinery instead of manual labour, by rationalizing the division of labour and by standardizing parts. Cottage industries had long been employed for the production of some parts, but now the system was extended to all parts, and companies specializing in supplies multiplied. Foundries could cast frames to order, and wood could be properly seasoned and wooden parts supplied to order in many shapes and sizes. Companies specializing in actions had been known since the 1840s, and they certainly saved small makers a great deal of grief and money. The action makers were probably primarily responsible for the final victory of the Erard type of action. By using parts suppliers, even small companies could take advantage of economies of scale, and interchangeable parts meant that many small makers became, in effect, 'compilers' of pianos rather than manufacturers. The leading companies still boasted that they manufactured everything in their own plants, but their smaller competitors met a large need and a large market. People who could never afford a Steinway could buy an instrument made by Joseph P. Hale in the USA and revel in the status and musical presence of a piano. If Hale's instruments were not as 'good' as Steinway's, they nevertheless served essential musical and social needs.

The piano began to be more than a European instrument. It spread to European colonies, as colonial officials and settlers desired the cultural goods they had known at home. After the Meiji Restoration, when in 1868 Japan first opened itself to the West, the Japanese government began an intensive overhauling of the educational system, including the widespread teaching of the piano and violin in schools. American and European firms provided the instruments, though some Japanese makers such as Nishikawa of Tokyo began work even before the end of the 19th century. The American successes of 1867 also contributed to the extension of exports to all the world. Many firms did not participate, partly by choice, but the Germans and Americans were especially active, the Germans simply taking the Australian market away from English makers and having large positions in South American markets. Steinway's expansion into Germany in 1880 gave the company a strong place in European and English markets, and Steinway was the export leader in the USA.

By the onset of World War I, as well as being an international instrument, the piano had become universal as well; no longer found mostly in the drawing-rooms of the wealthy, it was now a nearly ubiquitous furnishing and a source of pride and pleasure in even extremely modest homes. It had also become a modern instrument, manufactured by the latest technological means, designed to withstand climates of all sorts, and marketed by the most up-to-date methods. Some strains were to be found in the industry. The problems of labour unionization had yet to be solved, and the

beginning of the 20th century saw some consolidations among firms, such as the purchase of several piano companies, including the proud old Boston firm of Chickering & Sons, by the American Piano Company. There were new companies, such as D.H. Baldwin in the USA, and rejuvenated old ones, such as Chappell in Britain and Ibach in Germany. Some old ones dropped from sight, notably Streicher in Vienna, and others were bought out, such as Brinsmead in England.

Cyril Ehrlich/Edwin M. Good

10. From 1915.

World War I effectively stopped piano manufacture in countries immediately affected by it, though American production was only restricted. After the war, production soon reached pre-war levels in England, France and the USA, and by 1927 Germany had regained its prior capacity. Public demand for pianos increased mightily during the boom years of the 1920s, when there was also an astounding rise in the production of automatic pianos, especially in the USA. Already in 1919 their production was greater than that of ordinary pianos; in 1923 it reached a peak of 56% of the entire American output of pianos. These mechanisms, invented before the war, came to their flower afterwards (see [PLAYER PIANO](#)). Earliest in general production was the Pianola of the Aeolian (later Aeolian American) Corporation, first a 'piano player' set in front of the keyboard that actually depressed the keys, and later a 'player piano' with the mechanism inside the piano's case. In Germany the Welte-Mignon was first brought out in 1904 and the Hupfeld company's [DEA REPRODUCING PIANO](#) in 1905. The major American 'reproducing' mechanisms were Aeolian's Duo-Art and the Ampico of the American Piano Company, both released in 1913.

If the rise of automatic pianos tended to diminish the level of active piano playing, other advancing modes of entertainment and recreation may have accelerated decline. During the 1920s the radio was becoming ever more popular as a source of musical and other entertainment – and it was, if anything, even easier to play than the player piano. Competition from the cinema and the automobile for recreational time and money was becoming formidable. Piano playing still attracted many people: the number of music teachers in the USA, where these competing modes of entertainment flourished to the highest degree, actually rose during the 1920s and 30s. Nonetheless, during this period the piano's status as a domestic instrument receded and has never been quite regular.

With the Depression piano manufacture underwent a drastic decline. American production fell to 10% of its pre-Depression level by 1932, German production to about 6% and English to about 30%. Various more or less drastic remedies were tried. Very small grands, well under 1.5 m in length and sometimes in odd shapes, including symmetrical ones, were designed to appeal to families with aspirations to status but straitened finances. As sounding instruments they were 'babies' but not grand. The Mathushek Company in New York attempted unsuccessfully to reinstate the square, in sizes considerably smaller than those familiar in the late 19th century. Beginning in England, very small uprights (the Americans called them 'spinets'), barely higher than keyboard level, were made; they had small soundboards, short strings and 'drop' actions, all of which contributed to technological and tonal inadequacies. Many of them were virtually untunable, their touch was spongy and uncontrollable, their tone an assault on the ear. They were handsomely designed and took up little wall space and even less floor space, but they were probably responsible for a great many children's complete loss of interest in playing the piano. However admirable these attempts to overcome the financial difficulties of the 1930s, their musical contributions were, if anything, negative, and they have been discontinued by almost all manufacturers.



Baby grand piano (the 'Elfin') by Broadwood, London, manufactured in 1924–30 (private collection)
John Broadwood & Sons, Ltd, London



Grand piano ('model 290, Imperial') by Bösendorfer, Vienna, first manufactured...

World War II brought an already badly depressed piano industry to a halt. Every country involved required piano companies to stop using valuable steel, iron and other materials for such frivolities as musical entertainment. Steinway manufactured gliders and was permitted to produce a few hundred small uprights for military use. German factories, almost entirely converted to war production, were mostly bombed out of existence (including Steinway's Hamburg factory). English and Japanese companies likewise contributed to the war effort. Some technological improvements came out of the war. The most important in materials were resin glues, less susceptible to temperature and humidity changes than hide glues, and plastics of various kinds, used for key coverings (ivory becoming

unusable as elephants were endangered), for bushings, and more recently for cases, allowing considerable freedom in modifying if not completely altering external shapes. Manufacture has benefited from the efficiency of automation technologies. Otherwise there have been few advances in piano design or materials since World War II. There were experiments with microtonal pianos (see [MICROTONAL INSTRUMENTS](#)), especially in the 1920s, and various methods of modifying the sound by 'preparing' the piano, most famously by John Cage beginning in the 1930s (see [PREPARED PIANO](#)). The actions that became standard in the late 19th century have remained so: the Erard action for grands and the tape-check for uprights, though small uprights use drop actions. Overstringing is universal, and European makers have given up their antipathy to the sostenuto pedal. Hammers and dampers are still made of felt, actions of wood, frames of cast iron, soundboards of spruce. The range of all models has been standardized at seven and a third octaves except for a few larger sizes (e.g. Bösendorfer's Imperial Grand with eight octaves, [fig.23](#)). Sizes have also been to some extent standardized. The concert grand is about 275 cm long. Bösendorfer's Imperial is about 15 cm longer; the Challen company in England celebrated King George V's silver jubilee in 1935 with a grand 356 cm long; and Fazioli made the largest grand in production in the late 20th century, 308 cm long. Upright sizes have been standardized to 'full' about 122 to 132 cm; 'studio', about 114 cm; 'console', about 107 cm; and 'spinet', about 91 cm (the latter almost entirely abandoned).



Action of a modern grand piano: on pressing the key the movement is transmitted via the pilot to the intermediate lever; the jack then acts on the roller of the hammer which rises towards the string. The moment the backward projection of the jack contacts the set-off button the jack moves back permitting the hammer to escape and to continue in free flight to strike the string and then begin its descent; it is then caught and retained by the check and repetition lever as long as the key remains depressed. If the key is partly released the hammer is freed from the check, and the roller is acted on directly by the repetition lever; it is thus possible to strike the key again by depressing the key a second time (the jack will re-engage with the roller only when the key has been fully released so that a full hammer stroke may be made)

Bibliography

A: General literature

ClinkscaleMP

- D. Spillane: *History of the American Pianoforte* (New York, 1890/R)
- R.E.M. Harding: *The Piano-Forte: its History Traced to the Great Exhibition of 1851* (Cambridge, 1933/R, 2/1978/R)
- E. Closson: *Histoire du piano* (Brussels, 1944; Eng. trans., 1947, rev. 2/1974 by R. Golding)
- A. Loesser: *Men, Women and Pianos: a Social History* (New York, 1954/R)
- D. Wainwright: *The Piano Makers* (London, 1975)
- C. Ehrlich: *The Piano: a History* (London, 1976, 2/1990)
- M. Bilson: 'The Viennese Fortepiano of the Late 18th Century', EMc, viii (1980), 158–62
- E.M. Good: *Giraffes, Black Dragons, and other Pianos: a Technological History from Cristofori to the Modern Concert Grand* (Stanford, CA, 1982, 2/2000)
- H. Schott: 'From Harpsichord to Piano: a Chronology and Commentary', EMc, xiii (1985), 28–38
- E. Ripin and others: *Piano* (New York and London, 1988)
- R. Palmieri: *Piano Information Guide: an Aid to Research* (New York and London, 1989)
- R. Palmieri, ed.: *Encyclopedia of Keyboard Instruments*, i: *The Piano* (New York, 1994)

B: Collections

- W. Pole: *Musical Instruments in the Great Industrial Exhibition of 1851* (London, 1851)
- 'Reports on Musical Instruments', *Exhibition of the Works of Industry of All Nations 1851: Reports by the Juries*, i (London, 1852), 705–30
- E. Schelle: 'Musikalische Instrumente', *Officieller Ausstellungs-Bericht*, xv (Vienna, 1873) [report of the Vienna Universal Exhibition, 1873]
- G. Kinsky: *Musikhistorische Museum von Wilhelm Heyer in Cöln: Katalog*, i (Cologne, 1910)
- V. Luithlen and K. Wegerer: *Katalog der Sammlung alter Musikinstrumente*, i: *Saitenklaviere* (Vienna, 1966)
- H. Schott: *Victoria and Albert Museum: Catalogue of Musical Instruments*, i: *Keyboard Instruments* (London, 1985)
- C. Ahrens, ed.: *Clavichord und Fortepiano: eine Musikinstrumentenausstellung der Stadt Herne* (Herne, 1989)
- H. Henkel: *Besaitete Tasteninstrumente: Deutsches Museum von Meisterwerken der Naturwissenschaft und Technik* (Frankfurt, 1994)
- J. Koster and others: *Keyboard Musical Instruments in the Museum of Fine Arts, Boston* (Boston, 1994)
- M. Cole: 'Tafelklaviere in the Germanisches Nationalmuseum: some Preliminary Observations', G SJ, I (1997), 180–207

C: General history

BoalchM

- J. Fischhof: *Versuch einer Geschichte des Clavierbaues* (Vienna, 1853)
- H. Welcker von Gontershausen: *Der Flügel* (Frankfurt, 1856)

- E.F. Rimbault: *The Pianoforte: its Origin, Progress and Construction* (London, 1860)
- C. Ponsicchi: *Il pianoforte: sua origine e sviluppo* (Florence, 1867)
- G.F. Sievers: *Il pianoforte* (Naples, 1868)
- O. Comettant: *La musique, les musicien, et les instruments de musique* (Paris, 1869)
- E. Brinsmead: *The History of the Pianoforte* (London, 1870, enlarged 3/1879/R)
- H. Welcker von Gontershausen: *Der Clavierbau in seiner Theorie, Technik und Geschichte* (Frankfurt, 1870)
- A. Marmontel: *Histoire du piano et de ses origines* (Paris, 1885)
- F.M. Smith: *A Noble Art: three Lectures on the Evolution and Construction of the Piano* (New York, 1892)
- W.B. White: *Theory and Practice of Pianoforte Building* (New York, 1906)
- H.E. Krehbiel: *The Pianoforte and its Music* (New York, 1911/R)
- A. Dolge: *Pianos and their Makers* (Covina, CA, 1911–13/R)
- S. Wolfenden: *A Treatise on the Art of Pianoforte Construction* (London, 1916, suppl. 1927, repr. together 1975)
- M. de Guchteneare: *Le piano: son origine, son histoire, sa facture* (Ghent, c1923)
- C. Sachs: *Das Klavier* (Berlin, 1923)
- H. Neupert: *Vom Musikstab zum modernen Klavier* (Bamberg, 1925, 3/1952)
- M.A. Blondel: 'Le piano et sa facture', *EMDC*, II/iii (1927), 2061–72
- E. Blom: *The Romance of the Piano* (London, 1928/R)
- A. Casella: *Il pianoforte* (Rome, 1937, 4/1967)
- A.E. Wier: *The Piano: its History, Makers, Players and Music* (London, 1940)
- P. Locard: *Le piano* (Paris, 1948, rev. 5/1974 by R. Stricker)
- W. Pfeiffer: *Vom Hammer: Untersuchungen aus einem Teilgebiet des Flügel- und Klavierbaus* (Stuttgart, 1948/R; Eng. trans., 1978)
- N.E. Michel: *Michel's Piano Atlas* (Rivera, CA, 1953, rev. 10/1997 as *Pierce Piano Atlas*)
- F.J. Hirt: *Meisterwerke des Klavierbaus: Geschichte der Saitenklaviere von 1440 bis 1880* (Olten, 1955; Eng. trans., 1968/R as *Stringed Keyboard Instruments, 1440–1880*)
- C. Clutton: 'The Pianoforte', *Musical Instruments through the Ages*, ed. A. Baines (Harmondsworth, 1961/R, 2/1966/R), 88–102
- W.L. Sumner: *The Pianoforte* (London, 1966, 3/1971)
- D.S. Grover: *The Piano: its Story from Zither to Grand* (London, 1976/R)
- F. Schulz: *Pianographie* (Recklinghausen, 1978, 2/1982)
- J.R. Gaines, ed.: *The Lives of the Piano* (New York, 1981)
- D. Gill, ed.: *The Book of the Piano* (Oxford, 1981)
- S.K. Taylor, ed.: *The Musician's Piano Atlas* (Macclesfield, 1981)
- M. Pizzi: *Histoire du Piano: de 1700 à 1950* (Chambéry, 1983)
- D. Crombie: *Piano* (San Francisco, 1995)
- J. Parakilas, ed.: *Piano Roles: Three Hundred Years of the Piano* (New Haven and London, 2000)

D: Up to 1800

BurneyFIBurneyGNBurneyH

S. Maffei: 'Nuova invenzione d'un gravecembalo col piano, e forte, aggiunte alcune considerazioni sopra gl'instrumenti musicali', *Giornale de' letterati d'Italia*, v (Venice, 1711), 144–59; Ger. trans. in J. Mattheson: *Critica musica*, ii (Hamburg, 1725/R), 335–42

C.P.E. Bach: *Versuch über die wahre Art das Clavier zu spielen*, i (Berlin, 1753/R, 3/1787/R); ii (1762/R, 2/1797/R); Eng. trans. of pts i–ii (New York, 1949, 2/1951)

Ancelet: *Observations sur la musique, les musiciens et les instrumens* (Amsterdam, 1757/R)

K.C. Krause: 'Nachricht über eine w esentliche Verbesserung der Klaviaturen der Tasteninstrumente', AMZ, xii (1809–10), 649–52

C.F.G. Thon: *Ueber Klavierinstrumente: deren Ankauf, Behandlung und Stimmung* (Sondershausen, 1817)

E. de Bricqueville: *Le piano de Mme. DuBarry et le clavecin de la reine Marie-Antoinette* (Versailles, 1892)

A.J. Hipkins: *A Description and History of the Pianoforte and of the Older Keyboard Stringed Instruments* (London, 1896/R, 3/1929/R)

E. de Bricqueville: 'Le piano à Versailles sous Marie-Antoinette', *Revue de l'histoire de Versailles et de Seine-et-Oise*, viii (1906), 193–7

E. de Bricqueville: *Les ventes d'instruments de musique au XVIIIe siècle* (Paris, 1908)

W.H.G. Flood: 'Dublin Harpsichord and Pianoforte Makers of the Eighteenth Century', *Journal of the Royal Society of Antiquaries of Ireland*, xxxix (1909), 137–45

P. James: *Early Keyboard Instruments from their Beginnings to the Year 1820* (London, 1930/R)

H. Brunner: *Das Klavierklangideal Mozarts und die Klaviere seiner Zeit* (Augsburg, 1933)

N. Broder: 'Mozart and the "Clavier"', MQ, xxvii (1941), 422–32

C. Parrish: 'Criticisms of the Piano when it was New', MQ, xxx (1944), 428–40

H. Gough: 'The Classical Grand Pianoforte, 1700–1830', PRMA, lxxvii (1950–51), 41–50

U. Rück: 'Mozarts Hammerflügel erbaute Anton Walter Wien', MJb 1955, 246–62

H. Haupt: 'Wiener Instrumentenbauer von 1791 bis 1815', SMw, xxiv (1960), 12–84

R. Benton: 'The Early Piano in the United States', HMYB, xi (1961), 179–89

C.F. Colt: 'Early Pianos: their History and Character', EMc, i (1973), 27–33

E. Badura-Skoda: 'Prolegomena to a History of the Viennese Fortepiano', *Israel Studies in Musicology*, ii (1980), 77–99

C.F. Colt and A. Miall: *The Early Piano* (London, 1981)

B. Kenyon de Pascual: 'English Square Planos in Eighteenth-Century Madrid', ML, lxiv (1983), 212–17

V. Vitale: *Il pianoforte a Napoli nell'ottocento* (Naples, 1983)

S. Pollens: 'The Pianos of Bartolomeo Cristofori', JAMIS, x (1984), 32–68

V. Pleasants: 'The Early Piano in Britain (c1760–1800)', EMc, xiii (1985), 39–44

S. Pollens: 'The Early Portuguese Piano', EMc, xiii (1985), 18–27

W.H. Cole: 'The Early Piano in Britain Reconsidered', EMc, xiv (1986), 563–6

M. Hood: 'Nannette Streicher and her Pianos', *Continuo*, x (1986), no.9, pp.2–5; no.10, pp.2–7

A. Huber: 'Mensurierung, Besaitung und Stimmtonhöhen bei Hammerklavieren des 18. Jhdts', *Das Musikinstrument*, xxxv (1986), no.7, pp.58–62; no.9, pp.25–9

- B. Kenyon de Pascual: 'Francisco Pérez Mirabal's Harpsichords and the Early Spanish Piano', *EMc*, xv (1987), 508–14
- E. Badura-Skoda: 'Zur Frühgeschichte des Hammerklaviers', *Florilegium musicologicum: Helmut Federhofer zum 75. Geburtstag*, ed. C.-H. Mahling (Tutzing, 1988), 37–44
- A. Huber: 'Were the Early Italian and Portugese Pianofortes Strung Entirely with Brass?', *Das Musikinstrument*, xxxvii/1–2 (1988), 184–94
- S. Klima, G. Bowers and K.S. Grant, eds.: *Memoirs of Dr. Charles Burney* (Lincoln, NE, 1988)
- P. Everett: *The Manchester Concerto Partbooks* (New York, 1989)
- A. Huber: 'Der österreichische Klavierbau im 18. Jahrhundert', *Die Klangwelt Mozarts*, Kunsthistorisches Museum, 28 April – 27 Oct 1991 (Vienna, 1991), 47–72 [exhibition catalogue]
- J. Koster: 'Foreign Influences in French Eighteenth-Century Piano Making', *Early Keyboard Journal*, xi (1993), 7–38
- M. Latcham: 'The Check in some Early Pianos and the Development of Piano Technique Around the Turn of the Eighteenth Century', *EMc*, xxi (1993), 28–43
- M. Latcham: 'The Pianos of Johann Andreas Stein', *Zur Geschichte des Hammerklaviers: Blankenburg, Harz, 1993*, 15–49
- K. Komlós: *Fortepianos and their Music: Germany, Austria, and England, 1760–1800* (Oxford, 1995)
- C. Leli: *Van piano tot forte* (Kampen, 1995)
- S. Pollens: *The Early Pianoforte* (Cambridge, 1995)
- S. Rampe: *Mozarts Claviermusik, Klangwelt und Aufführungspraxis: ein Handbuch* (Kassel, 1995)
- J. Koster: 'The Divided Bridge, due Tension, and Rational Striking Point on Early English Grand Pianos', *JAMIS*, xxiii (1997), 5–55
- M. Latcham: 'Mozart and the Pianos of Gabriel Anton Walter', *EMc*, xxv (1997), 382–400
- M. Cole: *The Pianoforte in the Classical Era* (Oxford, 1998)
- S.K. Klaus: 'German Square Pianos with *Prellmechanik* in Major American Museum Collections: Distinguishing Characteristics of Regional Schools in the Late Eighteenth and Early Nineteenth Centuries', *JAMIS*, xxiv (1998), 27–80
- M. Latcham: 'Mozart and the Pianos of Johann Andreas Stein', *Gsj*, li (1998), 114–53
- R. Angermüller and A. Huber, eds.: *Mozarts Hammerflügel* (Salzburg, 2000)

E: After 1800

- 'Harpsichord', *Rees's Cyclopaedia* (London, 1819–20)
- "Felix": 'Piano Fortes', *The Euterpeiad*, iii (1823), 179
- C. Kützing: *Das Wissenschaftliche der Fortepiano-Baukunst* (Berne, 1844)
- C.A. André: *Der Clavierbau in seiner Geschichte, seiner technischen und musikalischen Bedeutung* (Offenbach, 1855)
- F.-J. Fétis: 'Instruments de musique', *Exposition universelle de 1867 à Paris: Rapports du jury international*, ed. M. Chevalier, ii/10 (Paris, 1868), 237–318
- A. Le D. de Pontécoulant: *La musique à l'Exposition universelle de 1867* (Paris, 1868)
- O. Paul: *Geschichte des Claviers vom Ursprunge bis zu den modernsten Formen dieses Instruments* (Leipzig, 1868/R)
- P. Stevens: 'Reports upon Musical Instruments', *Reports of the United States Commissioners to the Paris Universal Exposition*, 1867, ed. W.P. Blake (Washington, DC, 1870), v, 1–18
- J. Blüthner and H. Gretschel: *Lehrbuch des Pianofortebaues in seiner Geschichte, Theorie und Technik*

(Weimar, 1872/R, rev. 3/1909 by R. Hannemann as *Der Pianofortebau*, 4/1921)

L. Nalder: *The Modern Piano* (London, 1927)

V.A. Bradley: *Music for the Millions: the Kimball Piano and Organ Story* (Chicago, 1957)

W.S. Newman: 'Beethoven's Pianos versus his Piano Ideals', *JAMS*, xxiii (1970), 484–504

D. Melville: 'Beethoven's Pianos', *The Beethoven Companion*, ed. D. Arnold and N. Fortune (London, 1971; New York, 1971 as *The Beethoven Reader*), 41–67

C.I. Walsh: *An Economic and Social History of the Pianoforte in Mid- and Late-Victorian Britain* (diss., U. of London, 1973)

M. Bilson: 'Schubert's Piano Music and the Pianos of his Time', *Piano Quarterly*, xxvii/104 (1978–9), 56–61

C.A. Hoover: 'The Steinways and their Pianos in the Nineteenth Century', *JAMIS*, vii (1981), 47–89

M. Bilson: 'Beethoven and the Piano', *Clavier*, xxii/8 (1983), 18–21

R. Winter: 'The Emperor's New Clothes: Nineteenth-century Instruments Revisited', *19CM*, vii (1983–4), 251–65

D. Wythe: 'The Pianos of Conrad Graf', *EMc*, xii (1984), 447–60

R. Winter: 'Striking it Rich: the Significance of Striking Points in the Evolution of the Romantic Piano', *JM*, vi (1988), 267–92

S. Pollens: 'Early Nineteenth-Century German Language Works on Piano Maintenance', *Early Keyboard Journal*, viii (1990), 91–109

F: Local studies

C. Schafhäutl: *Die Pianofortebaukunst der Deutschen* (Berlin, 1854)

J.L. Bishop: *A History of American Manufactures from 1608 to 1860* (Philadelphia, 1861–6, enlarged 3/1868/R)

J. Parton: 'The Piano in the United States', *Atlantic Monthly*, xx (1867), 82–98

T. Appleton and others: 'The American Pianoforte Manufacture', *Musical and Sewing Machine Gazette* (21 Feb 1880)

Die Pianoforte von Schweighofer (Vienna, 1892) [catalogue]

W. Steinway: 'American Musical Instruments', *One Hundred Years of American Commerce 1795–1895*, ed. C.M. Depew (New York, 1895), 509–15

L. Bösendorfer: 'Das Wiener Klavier', *Die Grossindustrie Österreichs* (Vienna, 1898)

A. Kraus: 'Italian Inventions for Instruments with a Keyboard', *SIMG*, xiii (1911–12), 441–3

R.S. Clay: 'The British Pianoforte Industry', *Journal of the Royal Society of Arts*, lxvi (1917–18), 154–61 [see also general discussion, 161–3]

T.E. Steinway: *People and Pianos: a Century of Service to Music* (New York, 1953, 2/1961)

V. Luithlen: 'Der Eisenstädter Walterflügel', *MJb* 1954, 206–8

O. Rindlisbacher: *Der Klavierbau in der Schweiz* (Berne, 1972)

H. Ottner: *Der Wiener Instrumentenbau 1815–1833* (Tutzing, 1977)

N.J. Groce: *Musical Instrument Making in New York City during the Eighteenth and Nineteenth Centuries* (diss., U. of Michigan, 1982)

D. Wainwright: *Broadwood by Appointment: a History* (London, 1982)

O. Barli: *La facture française du piano de 1849 à nos jours* (Paris, 1983)

R. Burnett: 'English Pianos at Finchcocks', *EMc*, xiii (1985), 45–51

- L. Libin: *American Musical Instruments in The Metropolitan Museum of Art* (New York, 1985)
- S. Pollens: 'The Early Portuguese Piano', *Emc*, xiii (1985), 18–27
- W.H. Cole: 'Americus Backers: Original Forte Piano Maker', *English Harpsichord Magazine*, iv/4 (1987), 79–86
- C. Bordas Ibáñez: 'Dos constructores de pianos en Madrid: Francisco Flórez y Francisco Fernández', *RdMc*, xi (1988), 807–51
- A. Huber: 'Saitendrahtsysteme im Wiener Klavierbau zwischen 1780 und 1880', *Das Musikinstrument*, xxxvii/9 (1988), 84–94; also in *Saiten und ihre Herstellung in Vergangenheit und Gegenwart: Blankenburg, Harz, 1988*, 79–106
- C. Bordas Ibáñez: *Hazen y el piano en España: 175 años* (Madrid, 1989)
- C.H. Roehl: *The Piano in America, 1890–1940* (Chapel Hill, NC, 1989)
- J. Horowitz: *The Ivory Trade* (New York, 1990)
- R. Hopfner: *Wiener Musikinstrumentenmacher 1766–1900* (Vienna, 1999)

G: Other studies

- D. Spillane: *The Piano: Scientific, Technical, and Practical Instructions relating to Tuning, Regulating, and Toning* (New York, 1893)
- W.B. White: *The Player-Piano Up-To-Date* (New York, 1914)
- E.J. Dent: 'The Pianoforte and its Influence on Modern Music', *MQ*, ii (1916), 271–94
- W. Pfeiffer: *Taste und Hebeglied des Klaviers: eine Untersuchung ihrer Beziehungen im unmittelbaren Angriff* (Leipzig, 1920; Eng. trans., 1967)
- W. Pfeiffer: *Über Dämpfer, Federn und Spielart* (Frankfurt, 1962)
- E.D. Blackham: 'The Physics of the Piano', *Scientific American*, ccxiii/6 (1965), 88–99
- Der klangliche Aspekt beim Restaurieren von Saitenklavieren: Graz 1971*
- K. Ford: 'The Pedal Piano: a New Look', *The Diapason*, lxxv (1984), no.10, pp.10–11; no.11, p.6 only; no.12, pp.14–15
- A.W.J.G. Ord-Hume: *Pianola: the History of the Self-Playing Piano* (London, 1984)
- A. Huber: 'Deckelstützen und Schalldeckel in Hammerklavieren', *Studia Organologica: Festschrift für John Henry van der Meer*, ed. F. Hellwig (Tutzing, 1987), 229–52
- I. Blüthner-Haessler: *Pianofortebau: Elementar und umfassend dargestellt von einem Klavierbauer* (Frankfurt, 1991)
- R. Dunhill: *Handel and the Harris Circle* (Hampshire, 1995)
- R. Maunder: *Keyboard Instrument in Eighteenth-Century Vienna* (Oxford, 1998)

II. Piano playing

The history of piano playing is tied to a great many factors: the development of the instrument, the evolution of musical styles, shifts in the relationship of the performer to the score, the rise of virtuosity, the idiosyncrasies of individual artists, changes in audience tastes and values, and even socio-economic developments. On a more practical level piano playing is concerned primarily with matters of touch, fingering, pedalling, phrasing and interpretation. Even a discussion limited primarily to these can point out only the major signposts along the three centuries of the instrument's existence. Much of the lore surrounding the history of piano playing belongs more properly to the realm of anecdote or even myth than to scholarship; much work in this area remains to be done.

1. Classical period.

The earliest performers brought with them well-established techniques for playing the harpsichord and clavichord, both of which were essentially domestic instruments in spite of their cultivation at leading courts throughout Europe. The best international keyboard repertory required considerable agility, dexterity and coordination, but minimal strength. With a maximum range of five octaves, coupled with long-standing resistance on the part of composers to the fully chromatic use of the keyboard (embraced only by J.S. Bach), there were inherent limits to the musical and technical demands a composer might make upon a player.

Much emphasis has been placed upon the similarity of the early fortepiano to both the clavichord and the harpsichord. There exist parallels in case and in soundboard construction; but as far as the performer was concerned the piano imposed a set of new demands. The various escapements introduced as early as Cristofori allowed the pianist to exert more downward pressure than was feasible on a clavichord. The fortepiano, however, was without the resistance encountered in pressing a plectrum past a string; its dip was correspondingly shallower. While the dynamic range of the new instrument was greater than that of a clavichord, it could not achieve the clavichord's various gradations of *piano*, and its maximum volume was still less than that of a well-quilled harpsichord. The special skills required for playing the piano are acknowledged obliquely in C.P.E. Bach's *Versuch*, i (1753): 'The more recent fortepiano, which is sturdy and well built, has many fine qualities, although its touch must be carefully worked out, a task that is not without its difficulties'. It is known that both Carl Philipp Emanuel and his father had access to the Silbermann pianos at the court of Frederick the Great in Potsdam, where the former was employed, but apart from Johann Sebastian's suggestions for improving the action on his visit in 1747 there is no documentation of his performances on the new instrument. Hence for the first six decades or so after its invention the piano co-existed with its more established rivals. Marpurg's *Anleitung* (1755) treats keyboard instruments as a family with broad performance skills in common. Even Türk's *Clavierschule* (1789) – cited by Beethoven in a conversation book as late as March 1819 – is directed as much at clavichordists as pianists. Until one instrument came to be preferred by composers and players alike, it was not economically feasible to aim a method book at a specialized audience. It is probably safe to assume that a still hand and an even touch remained the primary objectives of keyboard players until well after the death of J.S. Bach.

The persistence of these virtues is displayed in a letter Mozart wrote to his father from Augsburg in October 1777, wherein he criticized in biting fashion the playing of Stein's little daughter, Nannette, presumably on one of the maker's new fortepianos:

"When a passage is being played, the arm must be raised as high as possible, and according as the notes in the passage are stressed, the arm, not the fingers, must do this, and that too with great emphasis in a heavy and clumsy manner. ... When she comes to a passage that ought to flow like oil and which necessitates a change of finger ... she just leaves out the notes, raises her hand, and starts off again quite comfortably. ... She will not make progress by this method ... since she definitely does all she can to make her hands heavy."

Mozart's rival Clementi still admonished his pupils in his treatise of 1801 to hold 'the hand and arm ... in an horizontal position; neither depressing nor raising the wrist. ... All unnecessary motion must be avoided'. Similarly, Dussek (1796) counselled the student 'never [to] displace the natural position of the hand'. Although Beethoven told Ries that he had never heard Mozart play, Czerny reported otherwise, attributing to Beethoven the observation that Mozart 'had a fine but choppy [*zerhacktes*] way of playing, no legato'. This remark must be understood against the background of the gradual shift from non-legato to legato that had its beginnings in the high Classical period. Nevertheless, the keyboard music of Beethoven supplies the most imaginative examples of non-legato in the first quarter of the 19th century. In spite of his own legendary virtuosity and gift for improvisation, it is hard to form a coherent picture of Beethoven's performing style from contemporary reports. According to one of the best-known accounts, that by Carl Czerny, 'his bearing while playing was masterfully quiet, noble and beautiful, without the slightest grimace. ... In teaching he laid great stress on a correct position of the fingers (after the school of

Emanuel Bach)'. But Czerny appears to contradict himself in reporting further that Beethoven's 'playing, like his compositions, was far ahead of his time; the pianofortes of the period (until 1810), still extremely weak and imperfect, could not endure his gigantic style of performance'. And, according to Beethoven's biographer Schindler, 'Cherubini, disposed to be curt, characterized Beethoven's pianoforte playing in a single word: "rough"'.

Whether Beethoven performed it himself or not, it is certain that works like the 'Hammerklavier' Sonata op.106 demanded far greater technical resourcefulness (including participation of the full arm) than anything written before 1818. The last articulate spokesman for the conservative Viennese tradition was Hummel, whose *Anweisung* (1828) emphasized 'ease, quiet and security' of performance. In order to realize these goals, 'every sharp motion of the elbows and hands must be avoided'. Nevertheless, Hummel consolidated many of the innovations in fingering that had been adopted by Beethoven and others. Almost two-thirds of his method is devoted to this subject, with great stress on the pivotal importance of the thumb. Along with his own music Hummel advocated serious study of J.B. Cramer's *Studio per il pianoforte* (1804–10) and Clementi's *Gradus ad Parnassum* (1817–26), two of the first systematic surveys of keyboard technique. Although Cramer's goal of the absolute equality of the ten fingers was eventually abandoned, his studies were recommended enthusiastically by composers with aims as diverse as Beethoven, Schumann and Chopin. The heavier, more resonant (and less clear) English instruments preferred (and, in Clementi's case, manufactured) by English and French performers are compared without prejudice by Hummel with the lighter, transparent Viennese instruments. The gradual domination of the English type, including the eventual adoption of the repetition patented by Erard in 1821, exercised a profound influence on the development of piano playing in the second half of the century.

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2. Romantic period.

The dawn of Romanticism in the 1830s brought with it the specialization that produced a breed of pianists who were to dominate the salons and concert halls of Europe for the next 80 years. Although the number of amateur pianists continued to grow, the keyboard became increasingly the realm of the virtuoso who performed music written by and for other virtuosos. It is no accident that two composers on the threshold of the new movement, Weber and Schubert, each wrote a great deal of highly original piano music but were also highly original orchestrators, while two full-blooded Romantics of the next generation, Chopin and Schumann, have their achievements more clearly bounded by the capabilities and limitations of the piano. Weber was an accomplished pianist, but both he and Schubert dreamt of success in opera; Chopin became a highly polished virtuoso, while Schumann tried to become one. Among Romantic composers, some shunned or showed little interest in the piano (Berlioz, Verdi, Wagner), and others lived from its extraordinary powers, both as performers and teachers (Chopin, Liszt, Thalberg). This division helps to explain the intense interest after Beethoven's death in developing a range of sonorities for the solo piano that could be compared to an orchestra. Perhaps the most colourful example of this concern is the account by Charles Hallé of a concert he attended in Paris in 1836:

"At an orchestral concert given by him and conducted by Berlioz, the 'Marche au supplice', from the latter's *Symphonie fantastique*, that most gorgeously orchestrated piece, was performed, at the conclusion of which Liszt sat down and played his own arrangement, for the piano alone, of the same movement, with an effect even surpassing that of the full orchestra, and creating an indescribable furore."

The problems of studying piano playing are even more formidable over the Romantic era than over its beginnings. There are several reasons for this. In spite of the proliferation of method books by such artists as Moscheles, Herz and Kalkbrenner, none of the most innovatory contributors to 19th-century pianism (Schumann, Mendelssohn, Chopin, Tausig, Liszt, Brahms and Leschetizky) compiled similar guides. Chopin left behind the barest torso of a method book,

apparently prompted largely by financial considerations and perfunctory in all but two respects. The closest testimonial in the case of Liszt is the largely neglected *Liszt-Pedagogium* (Leipzig, 1902), assembled by Lina Ramann with fellow pupils including August Göllerich.

Even more exasperating than the lack of guidance from the major performers themselves is the imprecision of the accounts in an age that worshipped flights of poetic fancy. From a novelist like George Sand one might expect the following description of Liszt at the keyboard:

"I adore the broken phrases he strikes from his piano so that they seem to stay suspended, one foot in the air, dancing in space like limping will-o'-the-wisps. The leaves on the lime trees take on themselves the duty of completing the melody in a hushed, mysterious whisper, as though they were murmuring nature's secrets to one another."

But the description of a professional musician like Hallé is scarcely of greater value:

"One of the transcendent merits of his playing was the crystal-like clearness which never failed him for a moment, even in the most complicated and, for anybody else, impossible passages ... The power he drew from the instrument was such as I have never heard since, but never harsh, never suggesting 'thumping'. Nor is Schumann's comment to Clara: 'How extraordinarily he plays, boldly and wildly, and then again tenderly and ethereally!'"

Mendelssohn is only slightly more helpful:

"[Liszt] plays the piano with more technique than all the others ... a degree of velocity and complete finger independence, and a thoroughly musical feeling which can scarcely be equalled. In a word, I have heard no performer whose musical perceptions so extend to the very tips of his fingers."



Liszt playing a grand piano by Ludwig Bösendorfer before Franz Josef in Budapest: painting (1872) by an unknown artist (private collection)

L. Bösendorfer Klavierfabrik AG, Vienna / Mansell / Time Pix / Katz

In the case of Chopin, the other revolutionary of Romantic piano playing, the ground is slightly firmer. It seems astonishing that, even as a fresh arrival in Paris, he could make the following remark:

"If Paganini is perfection itself, Kalkbrenner is his equal, but in a quite different sphere. It is difficult to describe to you his 'calm' – his enchanting touch, the incomparable evenness of his playing and that mastery which is obvious in every note."

Certain characteristics of Kalkbrenner's conservative style lingered, as in Chopin's advice to his young niece Ludwika to keep the 'elbow level with the white keys. Hand neither towards the right nor the left'. Chopin staked out a more individual position in the tantalizing fragment of a piano method, owned and transcribed by Alfred Cortot (now in *US-NYpm*; see J.J. Eigeldinger: *Chopin, vu par ses élèves*, Neuchâtel, 1970, 3/1988; Eng. trans., 1986 as *Chopin: Pianist and Teacher*):

"Provided that it is played in time, no one will notice inequality of sound in a rapid scale. Flying in the face of nature it has become customary to attempt to acquire equality of strength in the fingers. It is more desirable that the student acquire the ability to produce finely graded qualities of sound ... The ability to play everything at a level tone is not our object. ... There are as many different sounds as there are fingers. Everything hangs on knowing how to finger correctly. ... It is important to make use of the shape of the fingers and no less so to employ the rest of the hand, wrist, forearm and arm. To attempt to play entirely from the wrist, as Kalkbrenner advocates, is incorrect."

Chopin recommended beginning with the scale of B major, 'one that places the long fingers comfortably over the black keys. ... While [the scale of C major] is the easiest to read, it is the most difficult for the hands, since it contains no purchase points'. Although Hummel is cited by Chopin as the best source for advice on fingering, his own contributions to this area were bold and innovatory. The 27 studies composed in the decade between 1829 and 1839 (including three for Fétis and Moscheles's *Méthode des méthodes*) are a manifesto for techniques still in widespread use. While Cramer, Clementi and Hummel all include exercises based on arpeggios, Chopin extended their comfortable broken octaves to 10ths and even 11ths in his op.10 no.1; in spite of the easily imagined difficulties of high-speed execution he wrote to the strength of the hand, avoiding, for example, the weak link between the third and fourth fingers. The 'Black-Key' Etude op.10 no.5 teaches the thumb to be equally at home on black or white keys (ex.1). The study in octaves, op.25 no.10, demands the participation (forbidden by Kalkbrenner) of the entire arm. Chopin provided fingering more frequently than almost any other 19th-century composer, adding them not only to autographs and copies but into editions used by students such as Jane Stirling.



Ex.1 Chopin: Study in G op.10 no.5

Although Liszt's earliest efforts at technical studies were contemporary with those of Chopin, his own 'transcendental' studies, not published in their final form until after the latter's death, are repeatedly influenced by Chopin's example. The necessity for full involvement of the arm is readily evident from Liszt's fingerings in passages such as ex.2, from the sixth of the Paganini Studies. Brahms, who wrote two sets of variations on the theme of Paganini's A minor Caprice, favoured extensive cross-rhythms and metric shifts in his keyboard music. His specific contributions to piano technique are summarized in the 51 *Übungen* (1893), which feature large leaps, sudden extensions and equally sudden contractions, and the passing of the fifth finger (i.e. the whole hand) over the thumb. This last device is employed freely in both hands of his last piano piece, the Rhapsody op.119 no.4 (ex.3). Because of the lesser leverage available in the actions of the Viennese pianos that Brahms preferred, much of this technical expansion was accomplished on instruments with markedly greater resistance than that of present-day grands. Although data has been published purporting to show a steady increase in resistance through the 1870s, followed by a fall in the 20th century, much more extensive and reliable information will be needed before generalization about the relative touch of differing instruments will be possible. In the second half of the 19th century the only constant in this area was probably variety.

Ex.2 Liszt: Paganini Study no.6

Ex.3 Brahms: Rhapsody in E \flat op.119 no.4

The single most important development in the sound of the Romantic piano was doubtless the new emphasis on the sustaining (or damper) pedal. Although Czerny claimed that Beethoven 'made frequent use of the pedals, much more frequent than is indicated in his works', the sustaining pedal was almost universally regarded, up to the first quarter of the 19th century, as a special effect. Writers from Dussek (1796) to Adam (1802) and Hummel (1828) condemned the indiscriminate use of the sustaining pedal, reserving it for passages where an unusual sound was desired (as in the recitative added at the recapitulation of Beethoven's D minor Sonata op.31 no.2; [ex.4](#)). Directions for raising the dampers were transmitted in very individual ways by Romantic composers; Schumann was among the first to specify simply 'Pedal' at the head of a passage or movement, while Chopin generally supplied precise and detailed instructions (frequently ignored or suppressed by his 19th-century editors). It is seldom clear whether Chopin intended those passages not marked (such as all but the first three bars of the opening section of the F major Ballade op.38) to be played without the sustaining pedal, or whether it was to be added as general colouring at the performer's discretion.

Liszt's teacher Czerny was one of the first to exchange public performing for full-time instruction, but a dominant specialist teacher did not emerge until after mid-century in the person of Theodor Leschetizky, who numbered among his pupils Paderewski, Gabilovich, Schnabel, Friedman, Brailowsky, Horszowski, Moiseiwitsch and many more who achieved international fame. Although it became fashionable to speak of the 'Leschetizky method', Leschetizky himself steadfastly refused to freeze his views into print. In searching for the kernel his student Moiseiwitsch observed that 'above all there was his tone. No-one had a tone like his. He never taught us any "secret" there; one just picked up something of the lustre from him'. Perhaps an even greater contribution was Leschetizky's detailed and painstaking approach to the study of repertory, a tradition still pursued in countless masterclasses. Although his English successor Tobias Matthay (of German parentage) produced many books on piano playing, their tortuous language required explications by students (e.g. A. Coviello: *What Matthay meant*, 1948). Matthay's emphasis on muscular relaxation and forearm rotation was valuable as far as it went but has needed modification in the face of more detailed physiological investigations such as those of Otto Ortmann (1929). Ortmann's research led him to the not surprising conclusion that the most efficient playing requires a judicious balance between muscular relaxation and tension.



Ex.4 Beethoven: Sonata in D minor op.31 no.2, first movt

Few editors of piano music before 1930 approached their task with the reverence for the composer's intentions found in Schenker's 'Erläuterungsausgaben' (1913–21) of the late Beethoven sonatas. It was not only customary but expected that an editor would add his interpretative suggestions to those provided by the composer, rarely bothering to distinguish between the two. Since most 19th-century editors were themselves active performers who frequently claimed direct association with the composer of the repertory being edited, an interventionist attitude was inevitable. The most frequent text changes were the addition of articulation slurs in the music of Bach and Handel – then considered a regular part of the piano repertory – or the exchanging of articulation slurs (especially in the Viennese repertory from Haydn to Schubert) for longer phrase markings. The wholesale addition of dynamic and pedal

indications was equally acceptable. In performance the pianist reserved the right to introduce further changes, perhaps restricted to a few discreet octave doublings but perhaps also extending to the interpolation of embellishments and cadenzas. Although it is known that both Beethoven and Chopin objected to such practices, the practices flourished. The most gifted practitioner may have been Liszt, who did not regard even Chopin's music (as the latter bitterly noted) as sacrosanct. Nevertheless, Chopin himself occasionally interpolated embellishments and cadenzas into his music, as shown in an annotated version of op.9 no.2, which shows a variant of the cadenza and an added flourish to the final bar. In later years Liszt renounced his earlier habits, crusading relentlessly over the tinkling of salon music for the acceptance of works by Beethoven, Schubert, Berlioz and others.

The recent vogue for 'Urtext' editions has reaffirmed the importance of the composer in the chain leading to actual performance, but an enthusiasm for textual purity can prove dangerous when accompanied by naivety about the performing conventions and traditions known to contemporary players. In general, variety in articulation persisted much longer than is usually acknowledged, proving essential not only in the music of Haydn and Mozart but also in that of Schubert and Chopin. Romantic composers handled the issues of phrasing and articulation in highly individual ways, frequently alternating between the two types of notation within the same movement, section or even phrase. Because of the complex relationships among primary sources it is rarely a simple matter to establish an 'Urtext', as the comparison of two such editions of almost any work will prove. The realization that not only Mozart and Beethoven but also Chopin and Liszt played on instruments quite different from our own raises the nagging question of whether a modern performer on a modern instrument should attempt to adapt his playing style to that of the earlier piano or should feel free to make changes he feels are necessitated by intervening developments. Indeed, until a significant number of 19th-century instruments by such makers as Graf, Streicher, Broadwood, Bösendorfer, Pleyel, Erard and Steinway are restored to concert condition, there can be little more than speculation as to how they actually sounded, or even whether it would be desirable to include them as a regular part of concert life. Who would advocate playing keyboard music before Dussek (supposed to have been the first to turn his right profile to the audience) with his back to his listeners? Should music before Liszt (the first to perform regularly in public from memory) be played with the music and a page-turner? The renewed interest in historical performance will not make the performer's task less complex; it both increases the number of options and the obligation to become fully informed.

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3. 20th century.

The development of piano playing in the 20th century received its major impetus from Claude Debussy, who took up where Chopin had left off five decades earlier. Unlike most 19th-century piano composers, Debussy was no virtuoso (few accounts of his playing, and only a fragmentary recording accompanying Mary Garden in a scene from *Pelléas*, survive), but he was on intimate terms with the instrument to which he returned again and again. His piano music is an eclectic blend of Couperin and Chopin (the keyboard composers he admired most) combined with daring new harmonies and textures. The *Suite pour le piano* (1901) proved a landmark in 20th-century pianism, skilfully blending three centuries of keyboard tradition. It should be noted that Debussy achieved his finely graded pedal effects (never specified but always an integral part of the texture) without the benefit of the middle 'sostenuto' pedal found on most modern concert instruments. The capstone to Debussy's piano writing is the set of twelve *Etudes* (1915), fittingly dedicated to Chopin. Beginning with the spoof on 'five-finger exercises' through a chord study, these essays prepare the performer not only for the rest of Debussy's piano music but for much of the keyboard music that followed. Unlike the Romantic composers who cultivated a homogeneous blend, Debussy revelled in 'opposed sonorities', as in his *Etude* of that name (ex.5). In spite of notational fastidiousness in matters of dynamics and phrasing, he elected in the preface of the *Etudes* to grant the performer complete freedom in another important area:

"To impose a fingering cannot logically meet the different conformations of our hands. ... Our old Masters ... never indicated fingerings, relying, probably, on

the ingenuity of their contemporaries. To doubt that of the modern virtuosos would be ill-mannered. To conclude: the absence of fingerings is an excellent exercise, suppresses the spirit of contradiction which induces us to choose to ignore the fingerings of the composer, and proves those eternal words: 'One is never better served than by oneself'. Let us seek our fingerings!"



Ex.5 Debussy: Etude X (Pour les sonorités opposées)

The cross-influences between Debussy and Ravel may never be entirely sorted out, but it is at least clear that Ravel remained more drawn to the cascades of virtuosity inherited from Liszt. His special fondness for rapid repeated notes (as in *Gaspard de la nuit*) presupposes a crystalline control of touch and nuance essential to all of his music. Although also influenced by Debussy, Bartók travelled an increasingly individual path, beginning with the *Allegro barbaro* of 1911. He is noted for the spiky dissonance that punctuates his keyboard music, but it is too often forgotten that his own playing – both from the recollections of contemporaries and the evidence of numerous sound recordings – was infused with great elegance and rhythmic subtlety. Nevertheless, his frank exploitation of the percussive capabilities of the piano helped pave the way for the experiments with 'prepared' pianos first introduced in Cage's *Bacchanale* (1940) and embraced by many composers since. The placing of small wedges of india-rubber or other materials between the strings to modify the sound is curiously analogous to the mechanical means used in the harpsichord of two centuries earlier. Other means of tone production, such as tapping the case or the soundboard, have also been added. No standardized notation for transmitting these directions has evolved, varying not only from composer to composer but from work to work by the same composer. These idiosyncratic developments, along with the new interest in historical performance, have helped mitigate the increasing postwar homogenization in the interpretation of the standard repertory.

See also [KEYBOARD MUSIC, §III, 6–7](#).

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4. Jazz piano playing.

As an improvised art which is often highly complex, jazz places special demands on piano technique, and jazz pianists have evolved a brand of virtuosity quite distinct from that of the classical tradition. Jazz and blues pianists have not generally set out to acquire an all-embracing technique capable of handling a wide-ranging body of literature; each has concentrated instead on mastering a few technical problems which pertain to his or her individual style, personality and interests. Within these deliberately narrow confines their technical attainments have been quite remarkable, for example the perfect rhythmic separation of the hands required by the boogie-woogie style, the rapid negotiation of wide left-hand leaps in the stride style, or such individual traits as Teddy Wilson's gentle emphasis of inner counterpoints with the left thumb; even classical pianists have difficulty handling these technical problems without sacrificing jazz propulsion or 'swing'. Thus pianists of quite limited technique such as Jimmy Yancey, Thelonious Monk and Horace Silver have developed distinctive and inventive jazz styles, whereas virtuosos such as Friedrich Gulda, André Previn or Peter Nero have not been as successful.

Jazz piano playing evolved early in the 20th century from several separate strands, the most

important being ragtime, which was easily within the grasp of the amateur pianist. Its characteristic features – a march-like accompaniment pattern in the left hand against syncopated broken chords in the right – became more technically complex in the 1920s with the Harlem stride school. In a spirit of keen competition its members deliberately set out to dazzle listeners, and especially colleagues, with the speed and daring of their technique. One feature that became almost a fetish was the ‘solid left hand’, where three-octave leaps at rapid tempo were not uncommon and octaves were regularly replaced by 10ths. By contrast, the right hand played light and feathery passage-work with rapid irregular 3rds, 4ths and pentatonic runs (fingered 3–2–1–2–1). The finest jazz technician, Art Tatum, was especially adept at integrating the hands in rapid passage-work and commanded the admiration of Horowitz; few jazz pianists have been able to match his virtuosity, the only exception perhaps being Oscar Peterson.

A contrasting style arose in the late 1920s with the work of Earl Hines. His ‘trumpet style’ translated many of the inflections of jazz trumpeting to the right hand of the piano in the form of irregular tremolandos, clusters and punched chords and a thin texture with abrupt *sforzati* and cross-accents. Another development was the boogie-woogie blues style of the 1930s. Here an unwavering rhythmic pattern in the left hand was offset by irregular cross-rhythms and superimposed quintuplet and sextuplet subdivisions in the right, necessitating an absolutely secure rhythmic separation of the hands. Though crude and homespun by the standards of Tatum and Hines, boogie-woogie nevertheless left its mark on later rhythm-and-blues and rock pianists.

In the 1940s, the ‘bebop’ style represented a radical rethinking and simplification of previous jazz piano playing. The rhythmic function of the left hand was taken over by the drums and bass of an ensemble and the pianist was left to spin out long lines of ‘single-note’ melodies (i.e. with one note played at a time) while outlining the harmonic progressions and ‘kicking’ the beat with sparse chords in the left hand. The emphasis was on a precise and mobile right-hand technique capable of sudden cross-accents, which were generally accomplished by a quick wrist staccato. The inevitable outcome of this approach was an extremely restrained sonority (the pedals were virtually ignored), yet the best bop pianists such as Bud Powell, Thelonious Monk and Horace Silver cultivated a readily recognizable and inimitable touch.

Key figures of the late 1950s to rediscover the different timbres of the instrument were Bill Evans and Cecil Taylor. Evans cultivated an understated technique consisting of blurred pedal effects, careful spacing of notes in a chord (‘voicing’), a fondness for low dynamic levels and implied rather than explicitly stated rhythms. Taylor, who had conservatory training, chose avant-garde art music as his starting-point and pursued an extrovert and physically demanding style with clusters, glissandos and palm- and elbow-effects such as those found in Stockhausen’s later piano pieces. Both pianists made use of the full tonal range of the instrument, but to completely different ends.

By the later 20th century, emerging jazz pianists were usually trained in a sound classical technique and had a historical grasp of earlier jazz piano playing. This has led to interesting hybrids of classical and jazz technique, especially apparent in the work of Keith Jarrett and Chick Corea. The technical expertise of the players is considerable and almost encyclopedic in scope. The advent of the electric piano has brought a new array of technical problems, such as the handling of the bend bar and the manipulation of volume, wah-wah and other pedals; these have been particularly well mastered by Herbie Hancock and Josef Zawinul. Present-day jazz pianists, however generally prefer the acoustic to the electronic instrument and continue to probe new styles, whether the intricate rhythmic procedures of JoAnne Brackeen and Brad Mehldau, or the virtuoso effusions of Simon Nabatov.

J. Bradford Robinson

Bibliography

C.P.E. Bach: *Versuch über die wahre Art das Clavier zu spielen*, i (Berlin, 1753/R, 3/1787/R); ii (1762/R, 2/1797/R); Eng. trans. of pts i–ii (New York, 1949, 2/1951)

F.W. Marpurg: *Anleitung zum Clavierspielen* (Berlin, 1755, repr. Amsterdam, 1760/R, 2/1765)

- D.G. Türk: *Clavierschule* (Leipzig and Halle, 1789/R; Eng. trans., 1982)
- J.L. Dussek: *Instructions on the Art of Playing the Piano-Forte or Harpsichord* (London, 1796)
- M. Clementi: *Introduction to the Art of Playing on the Piano Forte* (London, 1801/R)
- L. Adam: *Méthode de piano* (Paris, 1802, 2/1805/R)
- A. Streicher: *Kurze Bemerkungen über das Spielen, Stimmen und Erhalten der Forte-piano* (Vienna, 1802)
- J.N. Hummel: *Ausführliche theoretisch-practische Anweisung zum Piano-Forte-Spiel* (Vienna, 1828, 2/1838; Eng. trans., 1829)
- C. Montal: *L'art d'accorder soi-même son piano* (Paris, 1836/R)
- C. Czerny: *Letters to a Young Lady on the Art of Playing the Pianoforte*, ed. and trans. J.A. Hamilton (New York, ?1837–41)
- W. von Lenz: *Die grossen Pianoforte-Virtuoson unserer Zeit aus persönlicher Bekanntschaft: Liszt, Chopin, Tausig, Henselt* (Berlin, 1872; Eng. trans., 1899/R)
- A. Marmontel: *L'art classique et moderne du piano* (Paris, 1876)
- A. Fay: *Music-Study in Germany*, ed. M. Fay Pierce (Chicago, 1880/R)
- F. Kullak: *Aesthetics of Piano-Forte Playing* (New York, 1893)
- E. Pauer: *A Dictionary of Pianists and Composers for the Pianoforte* (London, 1895)
- C.E. Hallé and M. Hallé, eds.: *Life and Letters of Sir Charles Hallé* (London, 1896/R), 57
- M. Jaëll: *Le mécanisme du toucher* (Paris, 1897)
- C. Weitzman: *A History of Pianoforte-Playing and Pianoforte Literature* (New York, 1897/R)
- F. Kullak: *Beethoven's Piano-Playing* (New York, 1901)
- M. Brée: *Die Grundlage der Methode Leschetizky* (Mainz, 1902, 4/1914; Eng. trans., 1902/R)
- T. Matthay: *The Act of Touch* (London, 1903)
- M. Prentner: *The Leschetizky Method* (London, 1903) [Eng. and Ger.]; also publ as *The Modern Pianist* (Philadelphia, 1903)
- R.M. Breithaupt: *Die natürliche Klaviertechnik* (Leipzig, 1905–6, enlarged 3/1912–22)
- J. Hofmann: *Piano Playing* (New York, 1908/R)
- J. Hofmann: *Piano Questions Answered* (New York, 1909/R)
- E. New comb: *Leschetizky as I Knew him* (New York, 1921/R)
- J. Lhevinne: *Basic Principles in Pianoforte Playing* (Philadelphia, 1924/R1972 w ith preface by R. Lhevinne)
- A. Cortot: *Principes rationnels de la technique pianistique* (Paris, 1928; Eng. trans., 1937)
- O. Ortmann: *The Physiological Mechanics of Piano Technique* (London and New York, 1929/R)
- W. Giesecking and K. Leimer: *Modernes Klavierspiel nach Leimer-Giesecking* (Mainz, 1930, 3/1938 w ith suppl.; Eng. trans., 1932/R as *The Shortest Way to Pianistic Perfection*, R1972 w ith suppl. as *Piano Technique* pts.i and ii)
- E. Bodky: *Der Vortrag alter Klaviermusik* (Berlin, 1932)
- T. Matthay: *The Visible and Invisible in Pianoforte Technique* (London, 1932, 2/1947/R)
- A. Cortot: *Cours d'interprétation* (Paris, 1937)
- E.J. Hipkins: *How Chopin Played* (London, 1937)
- D. Ferguson: *Piano Interpretation: Studies in the Music of Six Great Composers* (New York, 1947)
- A. Coviello: *What Matthay Meant* (London, 1948)

- A. Foldes: *Keys to the Keyboard* (New York, 1948)
- L. Bonpensiere: *New Pathways to Piano Technique* (New York, 1953)
- J. Gát: *A zongorajáték technikája* (Budapest, 1954; Eng. trans., 1958, 2/1965, as *The Technique of Piano Playing*)
- E. Badura-Skoda and P. Badura-Skoda: *Mozart-Interpretation* (Vienna and Stuttgart, 1957; Eng. trans., 1962, as *Interpreting Mozart on the Keyboard*)
- G.G. Neigauz [H. Neuhaus]: *Ob iskusstve fortepiannoy igrī* (Moscow, 1958, 3/1967; Eng. trans., 1973, as *The Art of Piano Playing*)
- M. Harrison: 'Boogie Woogie', *Jazz*, ed. N. Hentoff and A. McCarthy (New York, 1959/R), 105–35
- P. Badura-Skoda, ed.: *Carl Czerny: Über den richtigen Vortrag der sämtlichen Beethoven'schen Klavierwerke* (Vienna, 1963) [annotated reprints from Czerny's *Erinnerungen an Beethoven* and *Vollständigen theoretisch-practischen Pianoforte-Schule* op.500]
- H.C. Schonberg: *The Great Pianists* (New York, 1963, 2/1987)
- J.F. Mehegan: *Contemporary Styles for the Jazz Pianist* (New York, 1964–70)
- J. Kaiser: *Grosse Pianisten in unserer Zeit* (Munich, 1965, 2/1972; Eng. trans., 1971)
- H. Grundmann and P. Mies: *Studien zum Klavierspiel Beethovens und seiner Zeitgenossen* (Bonn, 1970)
- D. Barnett: *The Performance of Music: a Study in Terms of the Pianoforte* (London, 1972)
- K. Wolff: *The Teaching of Artur Schnabel* (London, 1972, 2/1979 as *Schnabel's Interpretation of Piano Music*)
- R.R. Gerig: *Famous Pianists and their Technique* (Washington, DC, 1974)
- L. Kentner: *Piano* (London, 1976)
- J.M. Wildmen: 'The Function of the Left Hand in the Evolution of the Jazz Piano', *Journal of Jazz Studies*, v/2 (1979), 23–39
- U. Molsen: *Die Geschichte des Klavierspiels in historischen Zitaten* (Balingen, 1982)
- W. Taylor: *Jazz Piano* (Dubuque, IA, 1982)
- M. Weiss: *Jazz Styles and Analysis: Piano* (Chicago, c1982)
- J. Last: *Interpretation in Piano Study* (Oxford, 1983)
- L. Lyons: *The Great Jazz Pianists* (New York, 1983)
- H. Neuhaus: *The Art of Piano Playing* (London, 1983)
- V. Vitale: *Il pianoforte a Napoli nell' ottocento* (Naples, 1983)
- P. Badura-Skoda: 'Playing the Early Piano', *EMc*, xii (1984), 477–80
- R.A. Fuller: 'Andreas Streicher's Notes on the Fortepiano', *EMc*, xii (1984), 461–70
- P. Loyonnet: *Les gestes et la pensée du pianiste* (Montreal, 1985)
- L. Nicholson, C. Kite and M. Tan: 'Playing the Early Piano', *EMc*, xiii (1985), 52–8
- J. Ekier: 'Jak grał Chopin?', *Rocznik chopinowski*, xx (1988), 13–25; Eng. trans., as 'Frederick Chopin: How did he Play?', *Chopin Studies*, iv (1994), 9–21
- P. Rattalino: *Le grandi scuole pianistiche* (Milan, 1992)
- M. Schoenmehl: *Modern-Jazz-Piano: die musikalischen Grundlagen in Theorie und Praxis* (Mainz, 1992)
- C. Timbrell: *French Pianism* (White Plains, NY, and London, 1992, 2/1999)
- D.E. Rowland: *A History of Pianoforte Pedalling* (Cambridge, 1993)